User Manual

XRow Series Air Conditioner

SHENZHEN ENVICOOL TECHNOLOGY CO., LTD.

Statement

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- Thanks for buying Envicool products!
- In the process of use, this manual fails to be updated due to the updated drawings, leading to the fact that some graphics are different from actual unit, and please forgive us for the inconvenience, and actual supplied units shall prevail in terms of use!
- The company is committed to improving products and upgrading product functions constantly, and changes in documents provided will not be notified!

Chapter 1 Overview

1.1 Standards

XRow series air conditioners meet the GB/T 19413-2010 Unitary Air Conditioners for Computer and Data Processing Room standard.

1.2 Applications

XRow series cooling units are dedicated unitary air-conditioning system developed for Internet Date Center.

1.3 Model description

For the model description of the indoor units and outdoor units of the XRow series row air conditioners, please refer to Table 1-1 and Table 1-2 respectively.

Table 1-1 Model description of the indoor units of XRow series air conditioners

SN	Function	Code	Description
1~2	Series name	XR	XRow series row air conditioner
3~5	Cooling capacity code (First Three Digits)	0	Cooling capacity
		4	
		2210	
6	Cooling method (Sixth – Letter)	A	Air-cooled
		C	Chilled water
		W	Water-cooled
		R	Refrigerant cold water conversion (between rows)
7~8	Structure and air supply mode (Seventh&eighth – Letter)	H1	Installed between the cabinets; air in from the back; air out from the front; 45° two-way air supply.
		L4	Installed between the cabinets or integrated with the cabinets, with rear air inlet and front air outlet with 90 degree air supply on both sides.
9	Function (Ninth-Letter)	B	Cooling function
		H	Cooling and heating function
		C	Cooling and humidifying function

		P	Cooling, heating and humidifying function
10	Custom code (Tenth – Letter)	/	No integrated iFreecooling
		O	Integrated Ifrecooling

Table 1-2 Model description of the outdoor units of XRow series air conditioners

SN	Function	Code	Description
1	Series name	C	Outdoor CRAC cooling unit
2	Number of cycles	S	Single system
		D	Dual system
3	Heat rejection capacity code	0~9	Heat rejection capacity (kW)
4		0~9	
5	Optional function	F	Integrated iFreecooling
		U	Centralized condenser
		P	Centralized condenser with pump cabinet
		/	Standard type

Table 1-3 Model description of fluorine pump cabinet

SN	Function	Code	Description
1	Series name	IF	iFreecooling system
2	Module Type	P	Air cooled
3	Capacity	1	Small cooling capacity
		3	Medium cooling capacity
		5	Large cooling capacity

1.4 Product description and function introduction

XRow series row air conditioner is mainly used for environment control of the server racks in various data centers and it is specially designed to solve problem of high thermal density. It is available in various refrigerating outputs, and can be flexibly configured according to the actual demand of customers. Each set of XRow series row DX air conditioner is composed of indoor unit and outdoor unit. The indoor unit is installed inside the data center while outdoor unit is installed outside. The electrode humidifier and heater are optional.

The system controller can switch the functions (i.e., cooling, heating or humidification) automatically according to the set values of program and indoor environment conditions.

1.4.1 Control panel

The indoor unit of the XRow is configured with controller. The controller has Chinese &English LCD . The LCD is used for parameters setting and displaying temperature and humidity, system operation, set values and alarm information. The cooling and alarm control set values can be adjusted through these selection buttons for system operation.

All control set values and alarm set values in the system can be set by program. The temperature is displayed in Celsius degree on the LCD. Those set values are stored in internal memory, and will not be lost even when there is any power failure.

1.4.2 Indoor unit

For direct expansion (DX) units, the indoor unit is equipped with evaporator coils, electronic expansion valves, EC fans, drier filters, sight glasses, low pressure pressure sensors, temperature and humidity sensors, floor leak sensors, and condensate pumps (optional), compressor, high pressure switch, exhaust temperature sensor, etc.

XRow series inter-row air conditioners are divided into several airflow organization forms: back in and front out, back in and front, left and right air out.

1.4.3 Outdoor unit

The air cooled outdoor unit is installed outside of computer room.The outdoor units include axial fans, condensing coils, high-pressure pressure sensors, fan speed controllers, etc.

1.4.4 IF pump cabinet

IF pump cabinet is installed outdoors, including liquid reservoir, refrigerant pump, electrical components, etc.

1.4.5 System diagram

XRow series air conditioning unit includes the compressor system.The overall layout of the system is shown in Figure 1-1~Figure 1-2.

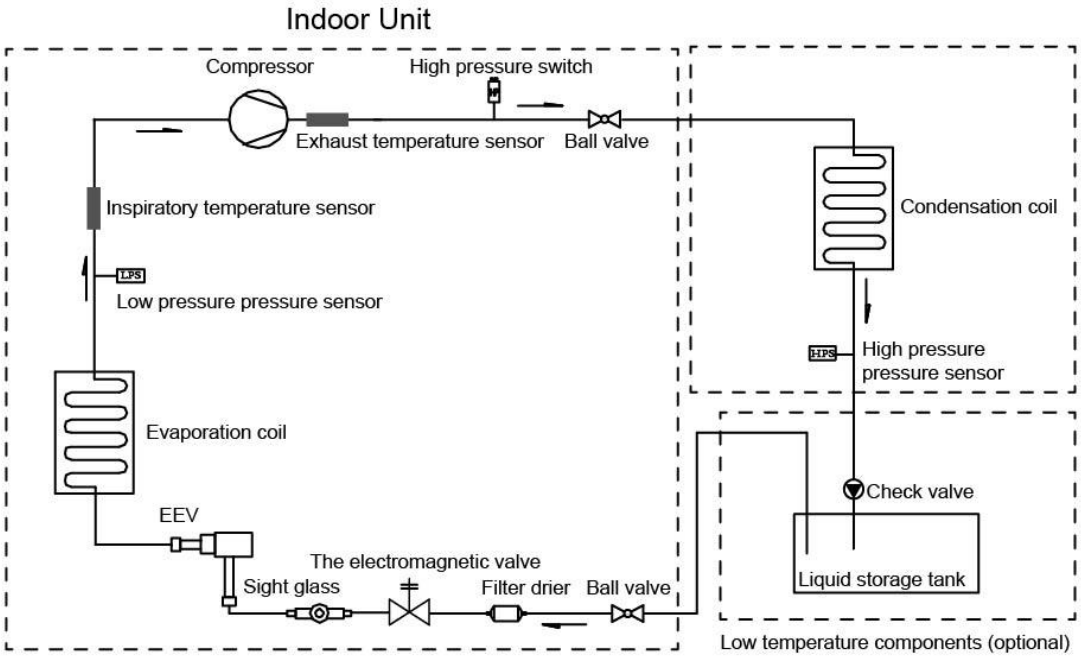


Fig. 1-1 System diagram of direct expansion unit

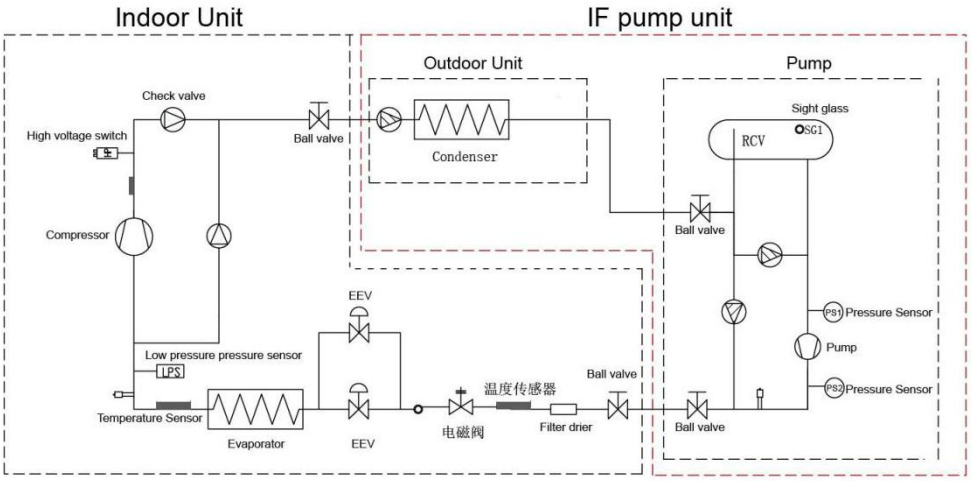


Fig. 1-2 System diagram of direct expansion unit (with pump cabinet)

1.4.6 Technical performance and safety function of unit system

Unit System adopts inverter compressor and fluorine pump control logic which can alternative the cooling capacity according to the temperature difference between the inside & outside environment. Through the inverter control technology, can make the system to achieve the optimal working condition. According to indoor and outdoor temperature and the cooling demand open fluorine pump operation, reduce the power consumption, so as to achieve the effect of energy saving.

Under system normal operation state, the system itself has the function of protecting the safety of the system, such as high and low pressure protection, over heat protection and so on.

System high pressure is likely to lead to system broken or device failure. Therefore the unit system through high pressure pressure sensor, monitoring the pressure status, when the system is in high pressure, occur the alarm, shut down the system.

1.5 Selectable device

1.5.1 Supply air deflector assembly

Optional this device can meet the needs of different air supply directions.

1.5.2 Dual power input switch

With this device, users can switch between different input power sources.

1.5.3 Condensate pump

Optional this device can collect the temperature and humidity near the multi-channel server rack.

1.5.4 External temperature and humidity sensor

Optional this device can collect the temperature and humidity near the multi-channel server rack

1.5.5 Smoke detector.

When the smoke detector detects smoke, it can immediately trigger the alarm system to turn off the air conditioning unit.

1.5.6 Fire detector

The fire detector monitors the temperature of the return air at the site, and immediately shuts down the air conditioning unit when it encounters high temperatures.

1.5.7 Low temperature components (optional)

When this device is selected, the XRow system can be as low as -40° C in an outdoor environment to ensure the reliable operation of the system.

Chapter 2 Onsite Preparation and Installation

2.1 Precautions for installation

Note

When handling the unit, you must keep the unit vertical. It is prohibited to handle the unit horizontally or upside down. Any damage caused to the unit for failing to observe this instruction shall not be covered by the warranty.

Before installing the equipment, you should decide how to modify the building to facilitate the piping, cabling and duct construction. Please install the units strictly according to the relevant drawings. For the reserved installation and maintenance space, please refer to the engineering dimension drawing provided by the manufacturer.

Indoor unit must be installed vertically,outdoor condenser should be installed in the well-ventilated area.

2.1.1 Storage and operation environment requirements of XRow series row air conditioner

For the storage and operation environment requirements of the XRow series air conditioner, please refer to Table 2-1 and Table 2-2.

Table 2-1 Storage environment requirement

Item	Requirement
Storage environment	Indoor, clean, dust free, etc
Ambient temperature	-40ºC~70ºC
Relative humidity	5%RH-90%RH
Storage time	The total transportation and storage time shall not exceed 6 months; otherwise, the performance shall be recalibrated.

Table 2-2 Operation environment requirement

Item	Requirement
Installation mode	Indoor unit: vertical installation; Outdoor unit: vertical installation; Refrigerant pump: vertical installation
Connecting pipe length	The longest horizontal pipeline length of XRow unit: 60m
Drop height	The outdoor unit is above the indoor unit (positive drop), the nominal maximum height difference: 30m, the nominal maximum pipe equivalent length: 60m; The outdoor unit is below the indoor unit (negative drop), the nominal maximum height difference: 10m, the nominal maximum pipe equivalent length: 60m..
Indoor ambient temperature	18ºC~40ºC
Outdoor ambient temperature	-15ºC~45ºC
Relative humidity	20%RH~80%RH
IP class of outdoor unit	IPX4
Altitude	<1000m, derated when the altitude exceeds 1000m
Operating voltage range	Three-phase power supply: 380V(-15%~+15%), Frequency: 50Hz (± 2.5Hz)

Note: If the relevant values in the actual application exceed the recommended values in the above tables, please consult the technical department of our company.

2.1.2 Arrival inspection

If possible, move the equipment to the place closest to its final installation location before unpacking. All the parts are shipped out after packing. When you receive the XR series products, you need to check whether all the parts are in good condition. If you find any damage during unpacking, please report it to the carrier immediately. If you find any concealed damage, please also report it to the transportation company and the air-conditioning equipment company.

2.2 Mechanical parameters

ⓘ Warning

You must strictly comply with the recommended installation and maintenance space requirement of the relevant equipment.

You should decide whether to modify the building to facilitate the piping, cabling and duct construction.

2.2.1 Outline dimensions

- For the outline dimensions of the unit, please refer to Fig.2-1 and Table 2-3.

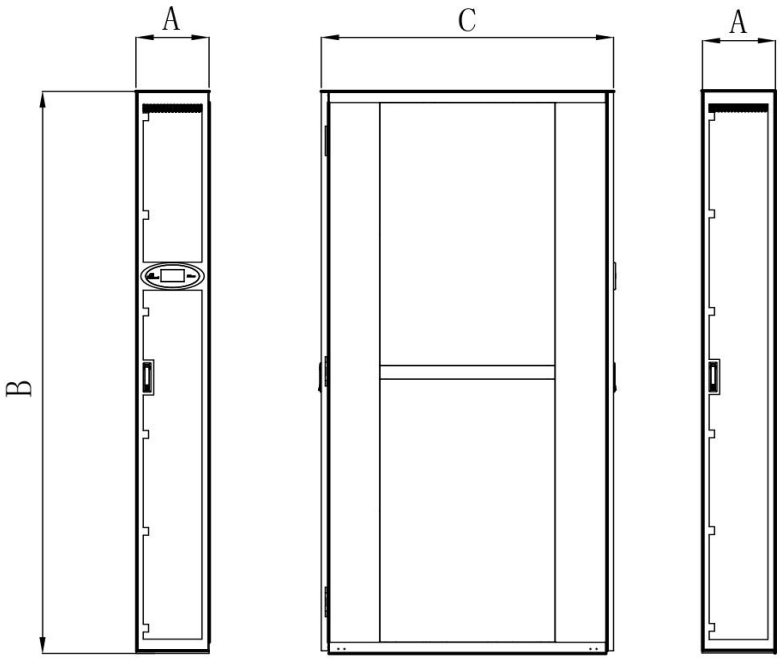


Fig. 2-1 Schematic diagram of the overall dimensions of the indoor unit

Table 2-3 Dimensions of the indoor unit (unit: mm)

机型	A	B	C
XR023A	300	2000	1000
			1100
			1200
		2200	1000
			1100
			1200
XR040A	600	2000	1000
			1100
			1200
		2200	1000
			1100
			1200
XR050A	600	2000	1100
			1200
		2200	1200

说明

At present, the depth of the indoor unit is 1200mm in the unit with pump cabinet system.

➢ For the dimensions of the outdoor unit, please refer to Figure 2-2,Figure 2-3 and Table 2-4.

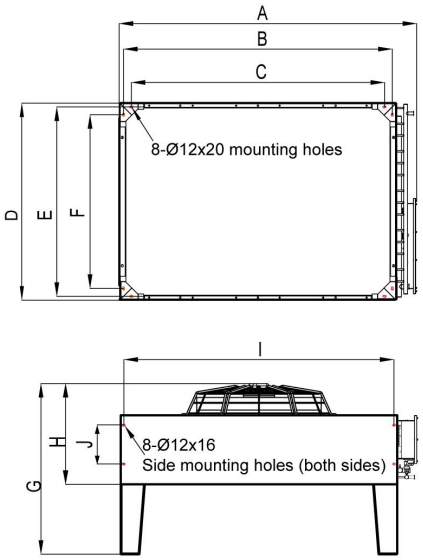


Fig. 2-2 Schematic diagram of the outline dimensions of a single fan outdoor unit

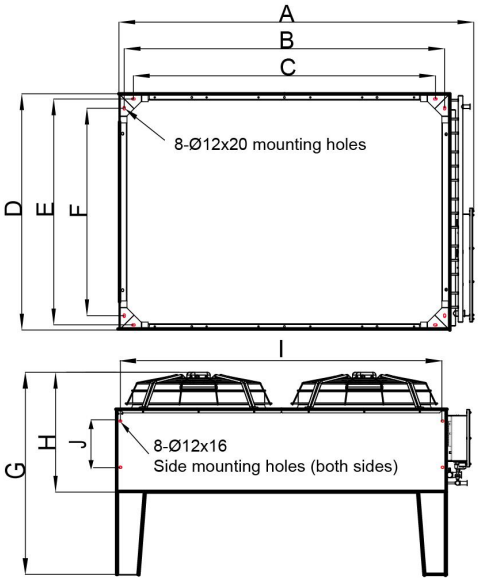


Fig. 2-3 Schematic diagram of the outline dimensions of the dual fan outdoor unit

Table 2-4 Outline Dimensions of outdoor units of CS series(Unit:mm)

Model	A	B	C	D	E	F	G	H	I	J	Fans
CS38	1610	1430	1330	982	927	827	1094	646	1140	250	1
CS46	1610	1430	1330	1269	1219	1119	1100	653	1140	250	1
CS54	1910	1730	1630	1269	1220	1120	1100	653	1740	250	1
CS66	1910	1730	1630	1269	1220	1120	1094	646	1740	250	2

Model	A	B	C	D	E	F	G	H	I	J	Fans
CS78	2410	2230	2130	1269	1220	1120	1099	651	2240	250	2
CS86	2410	2230	2130	1269	1220	1120	1136	688	2240	250	2

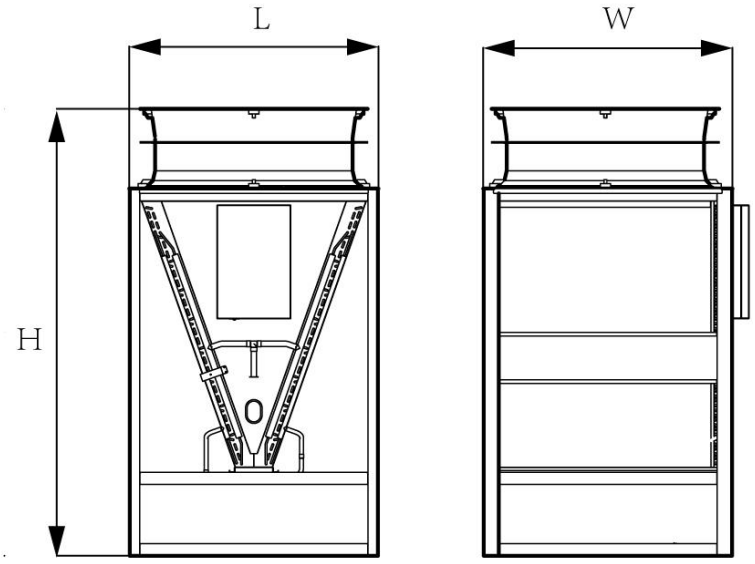


Fig. 2-4 V-type condenser dimensions

Table 2-5 V-type condenser dimensions (unit: mm)

Model	W	L	H
CS38U	1020	1020	1840
CS46U	1020	1020	1840
CS54U	1020	1020	1840
CS66U	1080	1080	2000
CS78U	1080	1080	2000
CS86U	1080	1080	2000

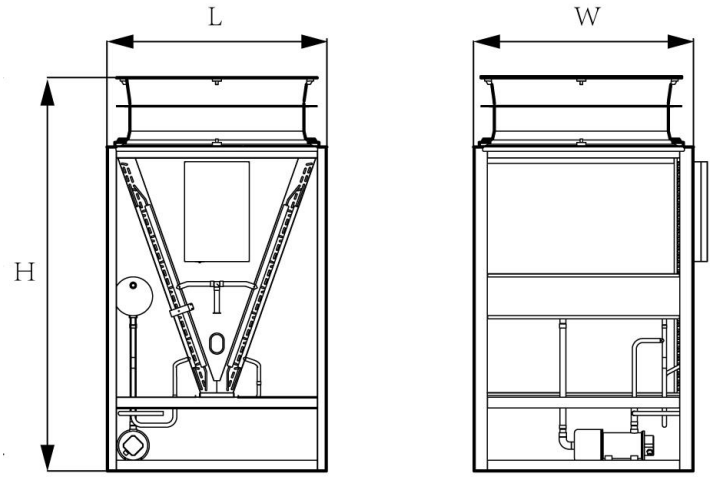


Fig. 2-4 Dimensional drawing of V-type condenser with pump cabinet

Table 2-5 Dimensions of V-type condenser with pump cabinet (unit: mm)

Model	L	W	H
CS38P	1020	1020	1840
CS46P	1020	1020	1840
CS54P	1020	1020	1840
CS66P	1080	1080	2000
CS78P	1080	1080	2000
CS86P	1080	1080	2000

Notes:

The size of the unit is the size of the land, and the protruding part of the electrical control box in the length direction is not counted.

- For the IF pump cabinet outline dimensions, please refer to Fig.2-5 and Table 2-6.

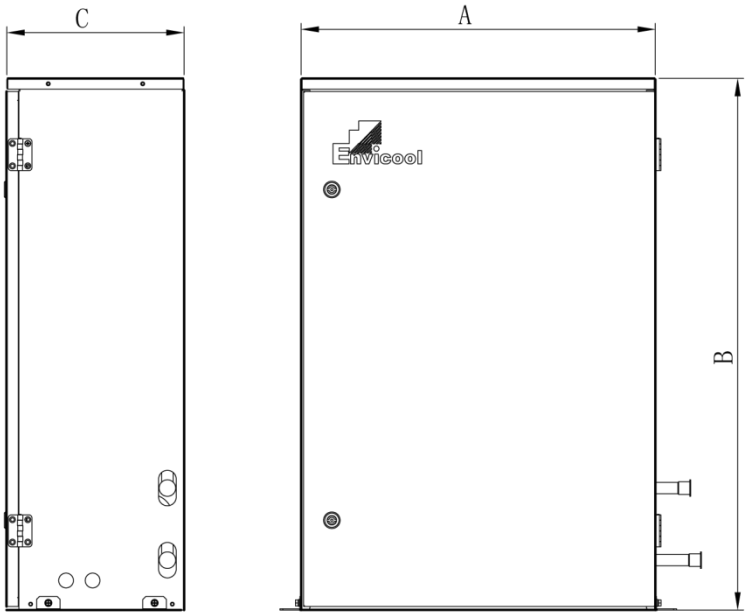


Fig. 2-5 Dimensions of IF pump cabinet

Table 2-6 Dimensions of IF pump cabinet (mm)

Model	A	B	C
IFP1C	600	900	300
IFP3C	600	900	300
IFP5C	600	900	300

- Mechanical parameters of cryogenic components (optional).

The outline dimension diagram of cryogenic components is shown in Figure 2-6 and Table 2-7.

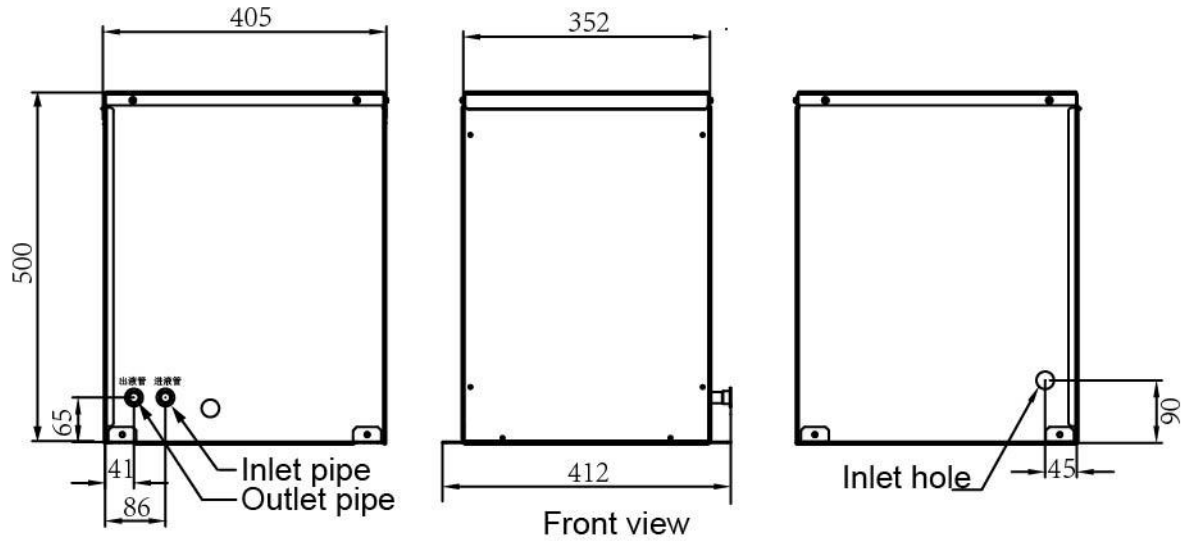


Fig. 2-6 Schematic diagram of the dimensions of cryogenic components

Table 2-7 Technical parameters of cryogenic components (mm)

机型	进/出液管尺寸	进线孔	底部安装孔
XR023A	Φ12.7	Φ25	Φ9
XR040A	Φ16	Φ25	Φ9
XR050A	Φ19	Φ25	Φ9

2.2.2 Installation and maintenance space requirements

When reserving the installation and maintenance space, the pipe connecting and front access space shall be considered. The maintenance and heat dissipation requirement of the compressor shall also be taken into consideration for the outdoor unit.

- As for installation and maintenance space size requirements of the XRow system indoor unit, please refer to Figure 2-7.

Notes:

XRow series indoor unit installation and maintenance space diagram is for reference only, the installation shall prevail in kind.

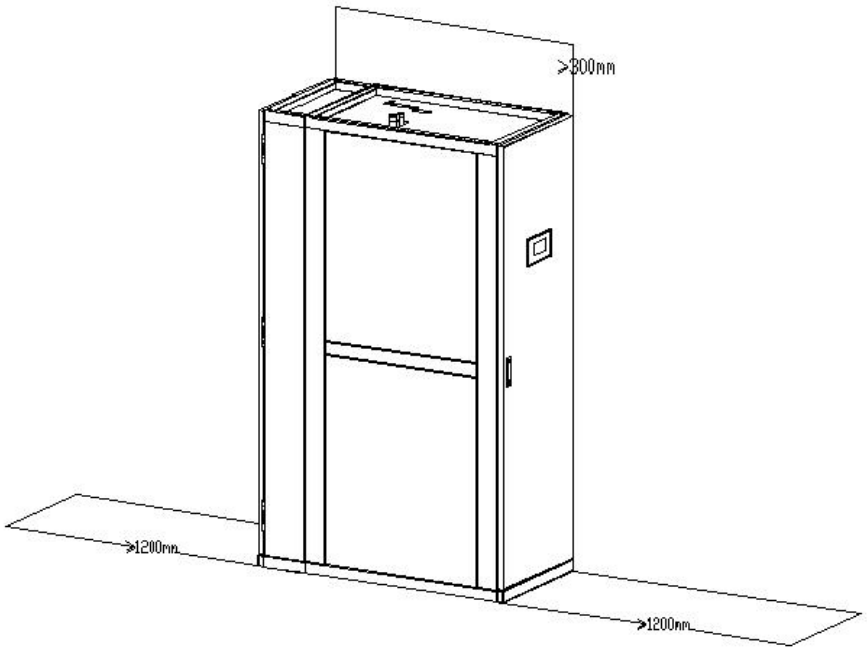


Fig. 2-7 Schematic diagram of installation and maintenance space of XRow series inter-row air conditioner indoor unit

- CS/CD series air conditioner can be Horizontal Mounted and Side Mounted,installation and maintenance space are refered in Fig.2-8~Fig.2-12 and Table 2-8.

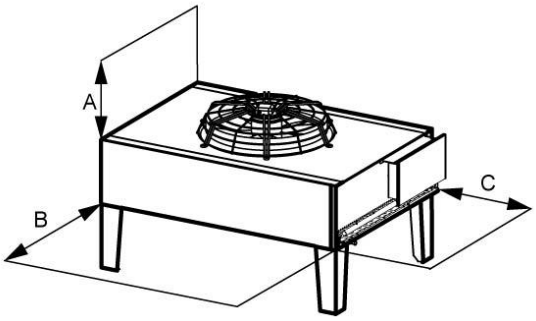


Fig. 2-8 Schematic diagram of installation and maintenance space on the front of a single fan outdoor unit

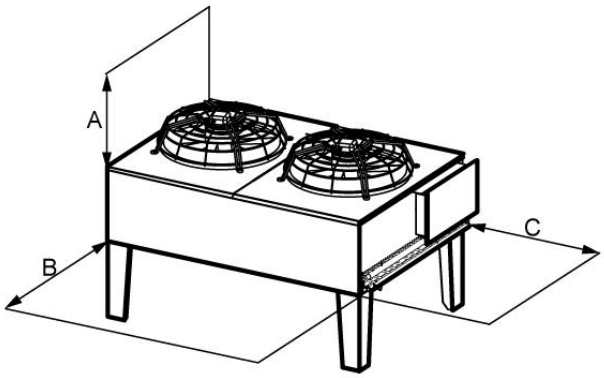


Fig. 2-9 Schematic diagram of the installation and maintenance space on the front of the dual-fan outdoor unit

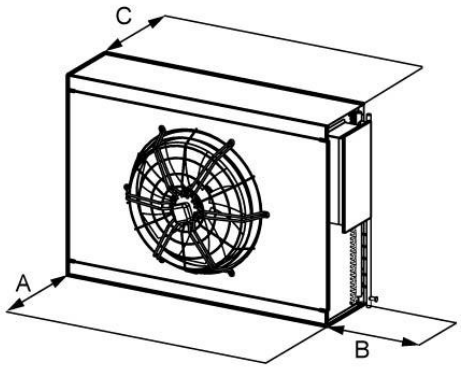


Fig. 2-10 Schematic diagram of installation and maintenance space on the side of a single fan outdoor unit

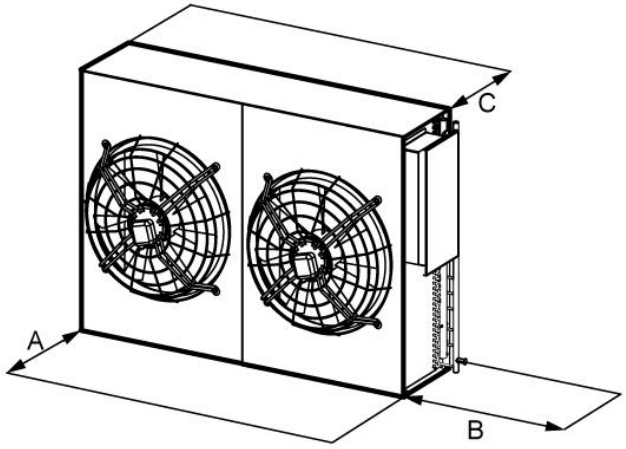


Fig. 2-11 Schematic diagram of the installation and maintenance space on the side of the dual fan outdoor unit

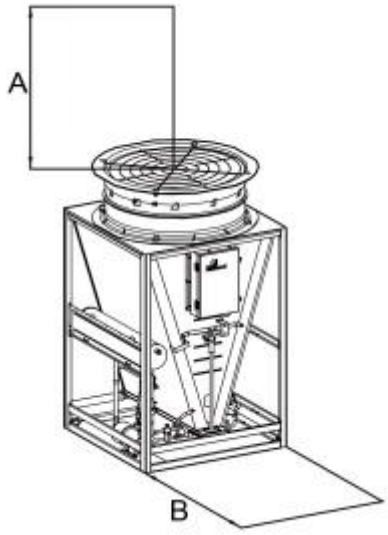


Fig. 2-12 Schematic diagram of V-shaped condenser installation and maintenance space

Table 2-8 Schematic diagram for the installation and maintenance space of the outdoor unit of the CS series air conditioner(Unit:mm)

Model	A	B	C
CS38/CS46/CS54/CS66/CS78/CS86	≥4000	600	600
CS38U/CS46U/CS54U/CS66U/CS78U/CS86U	≥4000	600	/
CS38P/CS46P/CS54P/CS66P/CS78P/CS86P	≥4000	600	/

Installation requirements for multiple condensers：

- In order to ensure the heat dissipation performance of the unit, please install the condenser where the outdoor air flow is smooth;
- In order to reduce the impact of noise on the surrounding environment, please install the condenser as far as possible from the residential area;
- To ensure the normal oil return of the system, please avoid installing the condenser below the indoor unit as much as possible;
- Should be installed vertically upwards;
- When installed side by side, the condensers should be installed at the same height to avoid short circuit of return air. As shown in Figure 2-13

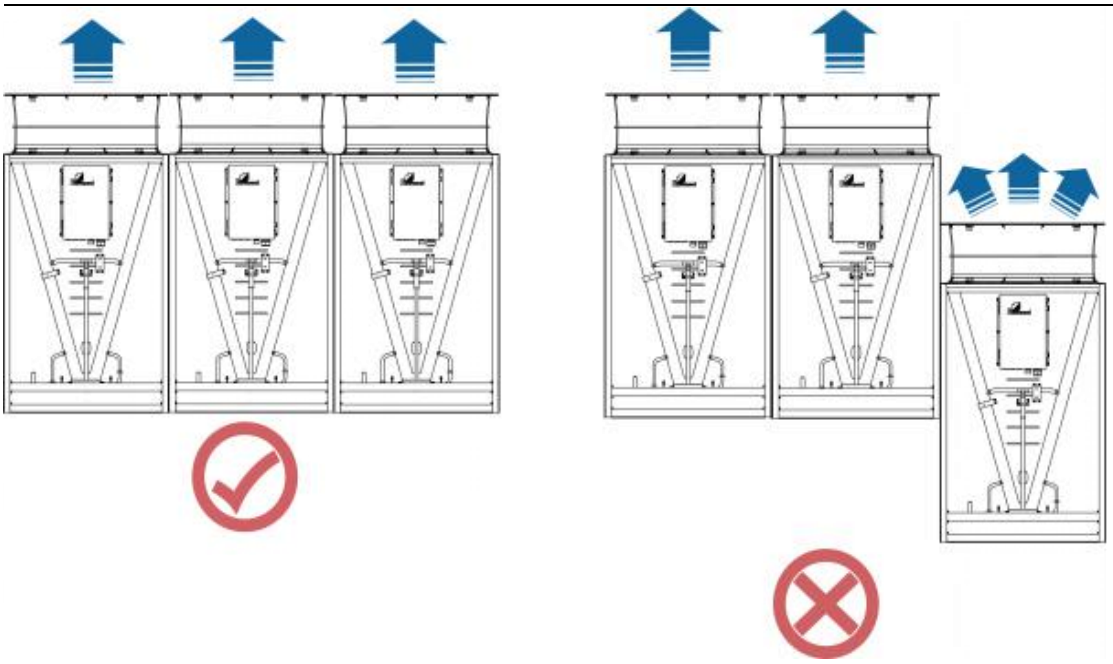


Fig. 2-13 Side-by-side installation layout

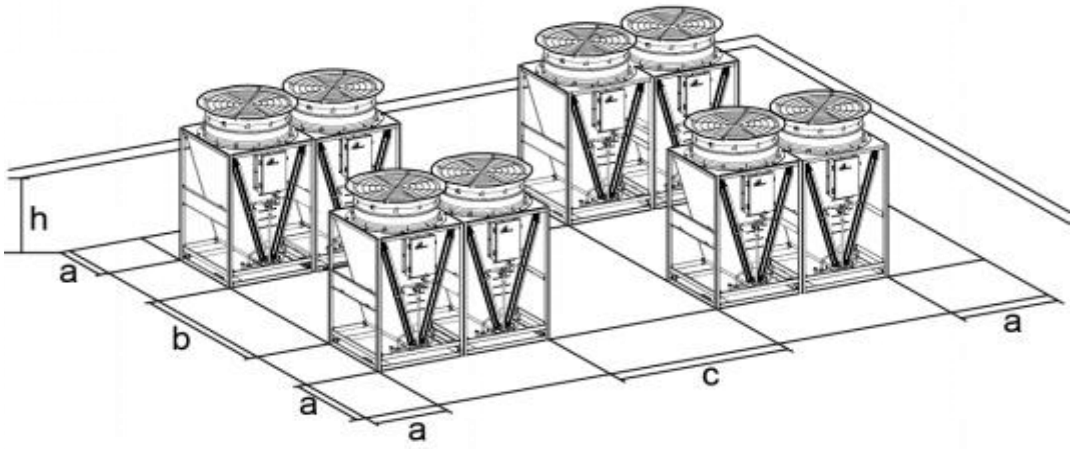


Fig. 2-14 Scattered installation space

Table 2-10 Scattered installation size table

Number of condensers installed separately 30 ~ 50			
Model	a	b	c
CS38U	1200	1500	1500
CS46U	1200	1500	1500
CS54U	1200	1500	1500
CS66U	1200	1500	1500
CS78U	1200	1500	1500
CS86U	1200	1500	1500

Less than 30 condensers are installed separately			
Model	a	b	c
CS38U	1200	1200	1200
CS46U	1200	1200	1200
CS54U	1200	1200	1200
CS66U	1200	1200	1200
CS78U	1200	1200	1200
CS86U	1200	1200	1200

Notes:

The condenser spacing in the picture requires the height of the surrounding wall without railings h≤0.5m. When the height of the external wall without railings h> 0.5m, the base of the outdoor unit needs to be increased accordingly (h-0.5) m;

No obstruction within 5000mm of condenser air outlet;

The condenser requires a maintenance space of at least 1300mm front and back or left and right;

If the condenser needs to be transported twice during installation, the distance between the condensers must be sufficient according to the actual handling situation;

The space requirements described below are based on the minimum separation distance within 10m around the place where the condenser is installed without high-rise buildings blocking air circulation.

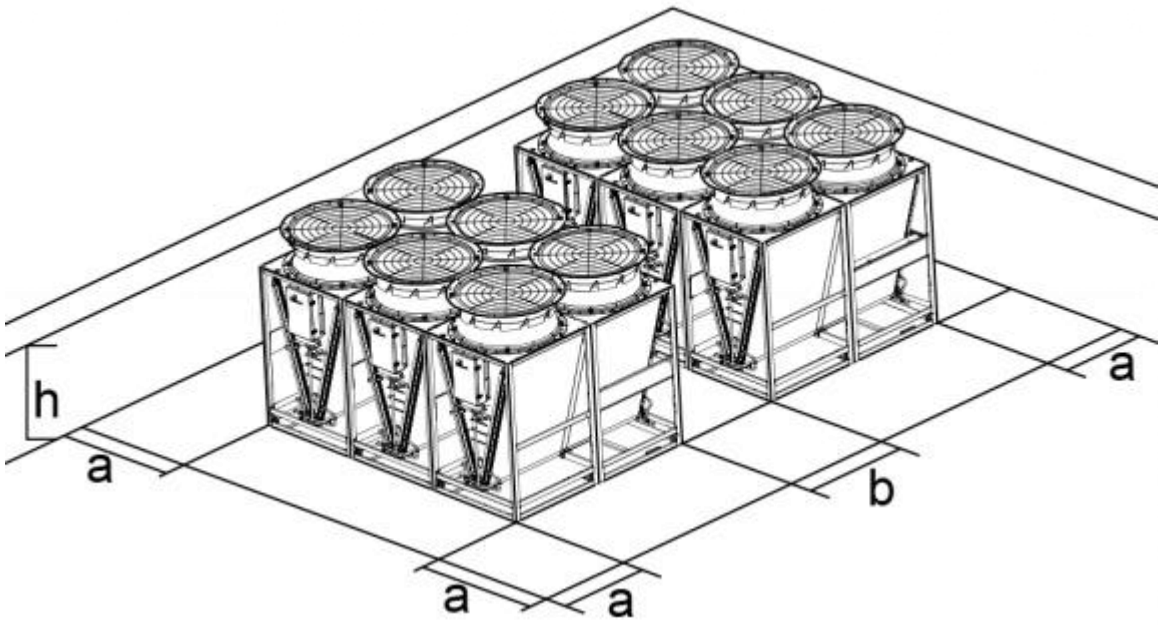


Fig. 2-15 Schematic diagram of side by side installation space

Table 2-11 Central installation size chart

Number of condensers installed separately 30 ~ 50		
Model	a	b
CS38U	1500	1800
CS46U	1500	1800
CS54U	1500	1800
CS66U	1500	1800
CS78U	1500	1800
CS86U	1500	1800
Less than 30 condensers are installed separately		
Model	a	b
CS38U	1800	2000
CS46U	1800	2000
CS54U	1800	2000
CS66U	1800	2000
CS78U	1800	2000
CS86U	1800	2000

Notes:

The condenser spacing in the picture requires the height of the surrounding wall without railings h≤0.5m. When the height of the external wall without railings h> 0.5m, the base of the outdoor unit needs to be increased accordingly (h-0.5) m;

When installed side by side, a distance of 20mm is reserved between two adjacent condensers so that the condensers can be installed during later maintenance.

- The space requirements for installation and maintenance of XRow series inter-row air-conditioning pump cabinet units are shown in Figure 2-16.

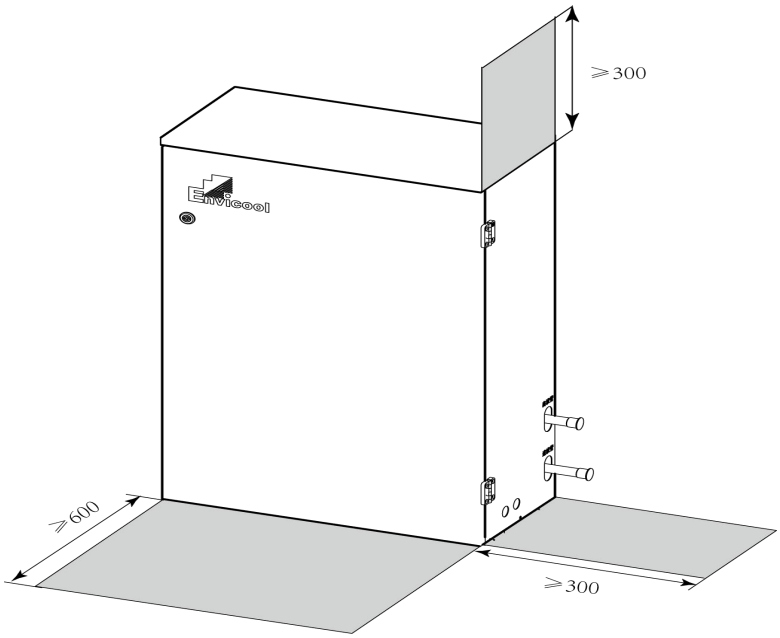


Fig. 2-15 Schematic diagram for the installation and maintenance space of the IF pump cabinet(unit: mm)

- XRow air conditioner low-temperature components installation and maintenance space requirements, as shown in Figure 2-16.

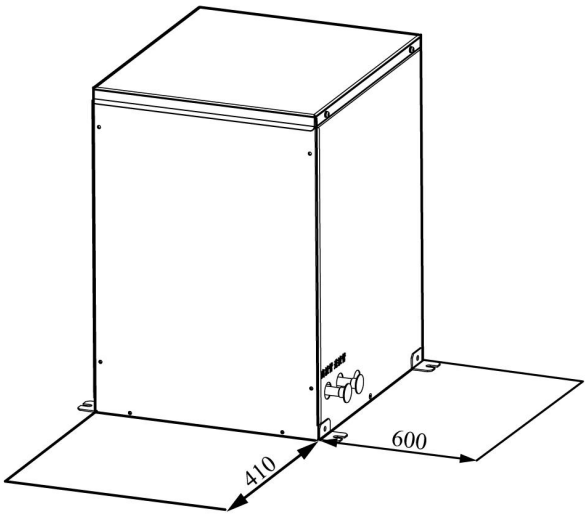


Fig. 2-16 Schematic diagram of installation and maintenance space for cryogenic components (unit: mm)

- The package size and gross weight of different models are listed in Table 2-12~ Table 2-14

Table 2-12 Indoor unit packaging size and gross weight

Model	Package size (L×W×H, mm)			Gross weight (kg)	Remarks
XR023A	300（816）	2000（2190）	1000（1136）	See packaging	Two packs
			1100（1236）		
			1200（1336）		
		2200（2390）	1000（1136）		
			1100（1236）		
			1200（1336）		
XR040A	660（736）	2000（2190）	1000（1136）	See packaging	One package
			1100（1236）		
			1200（1336）		
		2200（2390）	1000（1136）		
			1100（1236）		
			1200（1336）		
XR050A	600（736）	2000（2190）	1200（1336）	See packaging	One package
		2200（2390）	1200（1336）		
		2200（2390）	1200（1336）		

Note: The corresponding packaging size is shown in parentheses. For example, 1200 (1336) means that the net depth of the unit is 1200mm, and the corresponding packaging size is 1336mm; the net width of the unit 600mm corresponds to the packaging size width of 736mm.

Table 2-13 Outdoor unit packaging size and gross weight

Model	Package size (L×W×H, mm)	Gross weight (kg)
CS38	1790×755×1185	See packaging
CS46	1790×755×1500	See packaging
CS54	2090×755×1500	See packaging
CS66	2090×755×1500	See packaging
CS78	2590×755×1500	See packaging
CS86	2590×755×1500	See packaging
CS38U	1120×1161×2000	See packaging
CS46U	1180×1161×2000	See packaging
CS54U	1180×1161×2000	See packaging
CS66U	1180×1156×2210	See packaging
CS78U	1245x1185x2200	See packaging
CS86U	1245x1185x2200	See packaging
CS38P	1110x1180x2040	See packaging
CS46P	1110x1180x2040	See packaging
CS54P	1110x1180x2040	See packaging
CS66P	1245x1185x2200	See packaging
CS78P	1245x1185x2200	See packaging
CS86P	1245x1185x2200	See packaging

Table 2-14 IF pump cabinet packaging size and gross weight

Model	Packaging size (mm) (L*W*H)	Gross weight (Kg)
IFP1C	796*456*1160	See packaging
IFP3C	796*456*1160	See packaging
IFP5C	796*456*1160	See packaging

2.3 Installation of indoor/outdoor unit

2.3.1 Fixing of indoor unit / IF pump cabinet

Remove the indoor unit/pump cabinet case and transport pallet, and move the unit to the installation site. The indoor unit is reliably fixed on the indoor floor through the foot cup and is leveled. In order to ensure the normal operation of the unit, the entire unit must be kept level.

2.3.2 Fixing of outdoor unit

Remove the outdoor unit chassis and transport pallet, and secure the outdoor unit on the outdoor ground with expansion bolts. The location of the outdoor unit should be as safe as possible and easy to maintain. Do not place it on the ground floor in public places.

In order to ensure sufficient heat dissipation, the outdoor unit should be placed horizontally in a clean place, away from dust and foreign objects, because they may block the coil. The outdoor unit cannot be placed near steam, hot steam, or waste hot steam, and a distance of more than 500mm from walls, obstacles or nearby equipment should be kept. The equipment should not be placed where heavy snow may accumulate at the air inlet and outlet.

2.3.3 Installation of cryogenic components

The low-temperature component is installed between the indoor unit and the outdoor unit (see schematic diagram), and the low-temperature component is reliably fixed to the outdoor/indoor bracket with expansion bolts. The location of low-temperature components should be as safe as possible and easy to maintain. Do not place it on the ground floor in public places.

The installation dimensions are shown in Figure 2-17. It is recommended to use 4 M8 screws for installation and fixation.

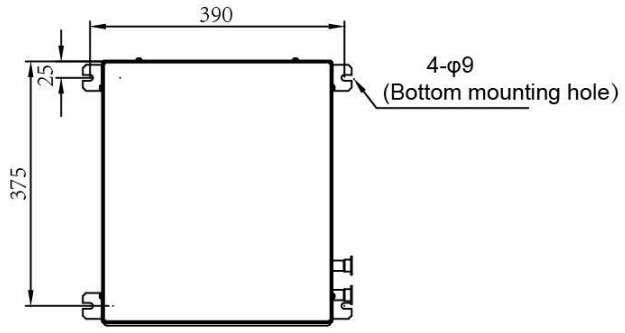


Fig. 2-17 Schematic diagram of installation at the bottom of cryogenic components(unit: mm)

Cation:

1. The low-temperature components are filled with part of the refrigerant at the factory, and the ball valve should be covered with a damp cloth when welding.

2. The cryogenic component is equipped with a liquid storage tank, and the liquid level of the sight glass should be checked when filling the refrigerant, and the liquid level can reach half of the sight glass. If the outdoor temperature is relatively low, the heat exchanger of the outdoor unit can be blocked, and the condensing pressure will be high, and then filled with refrigerant so that the refrigerant reaches half of the sight glass of the reservoir. If the amount of refrigerant charged is inappropriate, the system will not operate normally.

2.4 System installation diagram

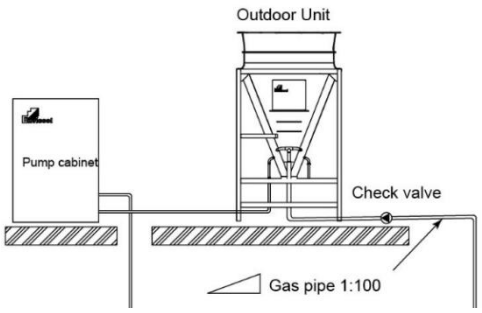
For the unit installation mode, please refer to Fig.2-35~ Fig.2-38.

Note

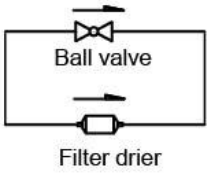
1. When the outdoor unit without pump cabinet is higher than the indoor unit, pay attention to install reverse bends on the gas side pipe and liquid side pipe of the outdoor unit condenser to avoid the backflow of liquid refrigerant during shutdown. When installing reverse bends, you must Ensure that the top elbow of the reverse bend is higher than the highest row of copper pipes in the condenser.
2. When the outdoor unit is higher than the indoor unit, if the outdoor unit is installed 6m higher than the indoor unit, oil return bends (oil traps) should be installed on the air side pipe every 6m to ensure the vertical height when the compressor is restarted after stopping Compressor oil returning from the upper gas side pipe to the return bend can be quickly taken away.
3. For units with pump cabinets, V-coil units with external units, or units with long piping, the gas measuring pipe must be equipped with a one-way valve; if the air-conditioning equipment is dual-circuit power supply or long piping, the liquid side pipe The solenoid valve must be configured and installed. The one-way valve is installed near the air inlet of the condenser of the outdoor unit, and the solenoid valve is installed near the liquid pipe of the indoor unit of the equipment for easy wiring. The solenoid valve coil needs to be waterproofed. The installation position is shown in Figure 2-18.
4. Due to space constraints, some units of inter-row air conditioners cannot install solenoid valves at the liquid pipes in the equipment, and need to be installed on the engineering pipelines. The installation direction of the solenoid valve should be consistent with the flow direction of the refrigerant. If you encounter installation problems, please

consult the air conditioning equipment company. If you need to install a solenoid valve, but it is not installed inside the air-conditioning equipment when leaving the factory, please find the solenoid valve to be installed in the delivery accessories. If you do not find it, please contact the air-conditioning equipment company.

5. When welding the solenoid valve, please pay attention to wrap a damp cloth.
6. The installation height of the bottom of the pump cabinet should be as low as possible or the same as the installation height of the external machine, and should not be higher than the installation height of the bottom of the condenser, to avoid the refrigerant in the liquid storage tank from flowing into the condenser. The schematic diagram is as follows (see Figure 2-18 for the complete installation diagram):



7. In order to ensure smooth oil return from the compressor, the horizontal air side pipeline should have an inclination of 1:100 in the direction away from the compressor. The proximal end is 10mm lower.
8. The outdoor unit is higher than the indoor unit, and the vertical height H1 should not exceed 30m; the outdoor unit is lower than the indoor unit, and the vertical height H2 should not exceed 10m. If you have special needs, please consult the equipment manufacturer. The air-conditioning equipment company will not bear any responsibility for equipment damage caused by non-compliance with the construction specifications required by the equipment manufacturer!
9. When the total length of the pipeline exceeds 50m, the engineering pipe liquid pipe needs to add a bypass filter assembly to prevent excessive impurities such as oxide scale in the pipeline during startup and commissioning, which may cause blockage of the dryer filter inside the unit. The bypass filter assembly should be installed in the engineering liquid pipe, near the inlet of the indoor unit liquid pipe. The schematic diagram of the bypass filter is as follows:



10. Note that after the bypass filter assembly is welded in the system, close the ball valve first, and keep the ball valve closed during debugging, so that the refrigerant in the system will pass through the filter to filter out most of the impurities in the system. The standby group will continue to run for 48 hours before opening The ball valve keeps the bypass filter assembly ball valve fully open from now on.

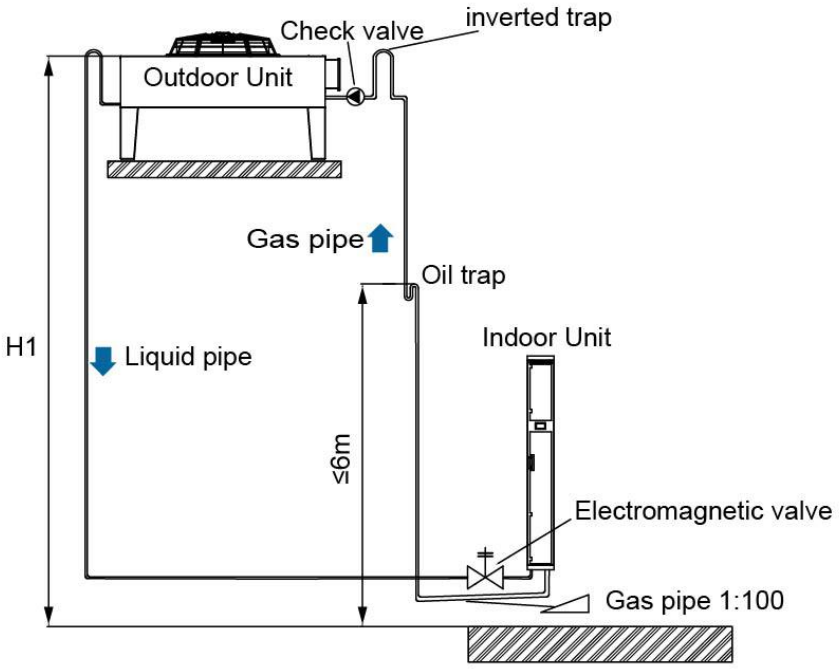


Fig. 2-18 Installation drawing (when the condenser is higher than the indoor unit)

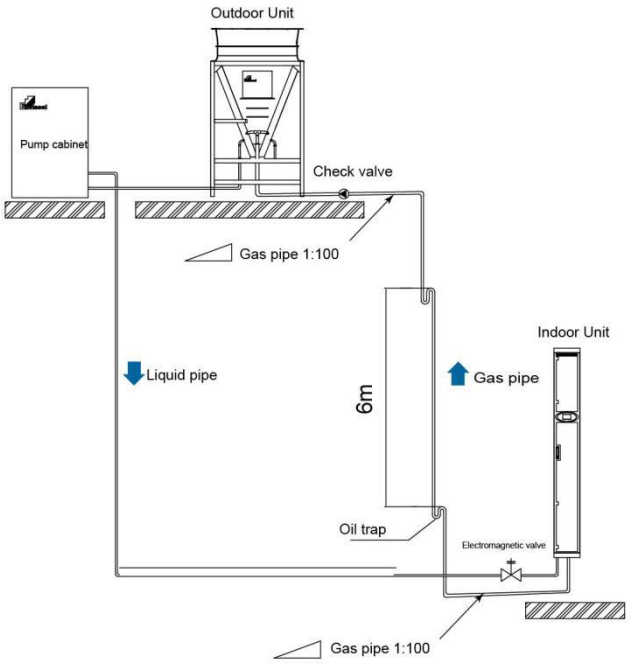


Fig. 2-19 Installation drawing (when the IF outdoor unit is higher than the indoor unit)

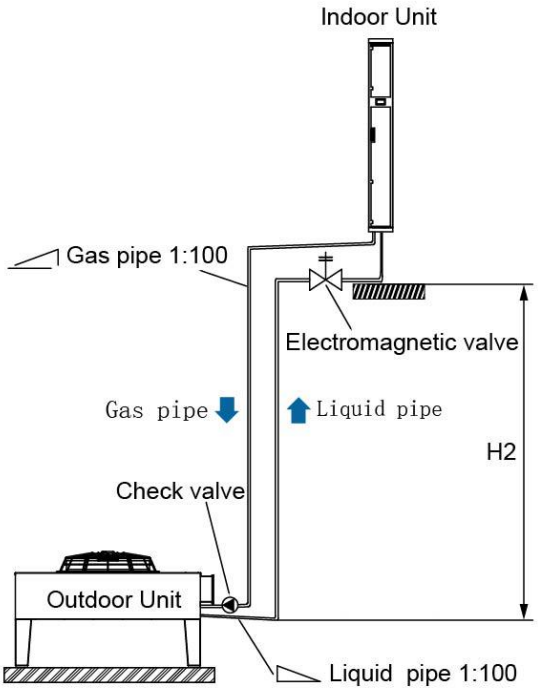


Fig. 2-20 Installation drawing (when the condenser is lower than the indoor unit)

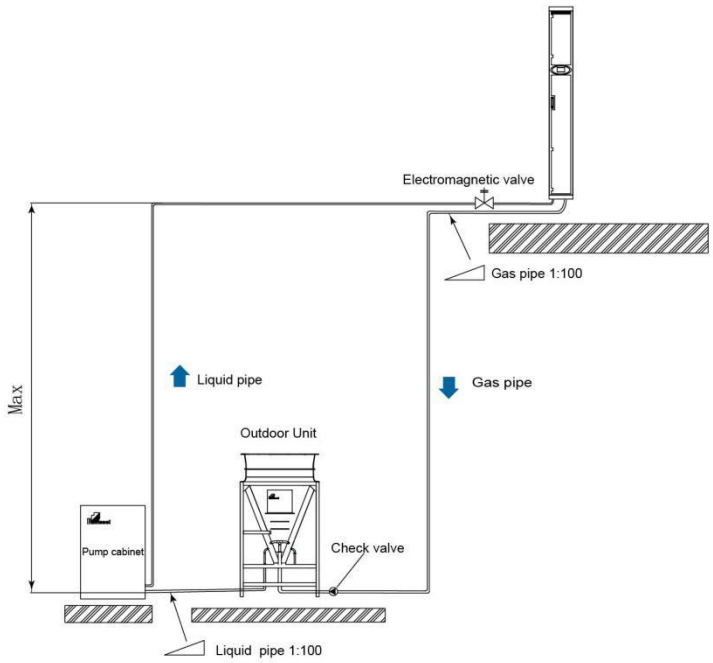


Fig. 2-21 Installation drawing (when the IF outdoor unit is lower than the indoor unit)

2.5 Pipe connection and refrigerant requirement

The pipes to be connected are as follows:

1. The water drainage pipe of indoor unit.
2. Humidifier of water supply pipe.
3. Refrigerant connecting copper pipe: thermal-insulating refrigerant connecting copper pipe for the indoor unit and outdoor unit, including the gas side pipe and liquid side pipe.

Note

1. Before starting the equipment, check and ensure that there is no leakage or seepage from all the connected pipes and joints.
2. The water drainage pipe of the unit shall not be higher than the water drainage outlet of the humidifier.

2.5.1 Water drainage pipe of indoor unit

The specifications for the condensing water drainage pipe of the indoor unit are 26mm (outer diameter)-19mm (inner diameter). The external pipe shall be fixed with the pipe hoop. The water drainage pipe shall not be placed in a place where the temperature is lower than 0ºC. The fixation of the water drainage pipe shall comply with the local or state engineering regulations.

Note

For the unit configured with humidifier, the material of its external water drainage pipe shall be able to withstand high temperature up to 100ºC. It is recommended to adopt galvanized steel pipe, hot water type aluminum-plastic composite pipe or hot water type PPR pipe.

2.5.2 Refrigerant connecting copper pipe

The indoor unit and the outdoor unit need to be connected by two refrigerant pipes, namely the insulated copper gas pipe and the liquid pipe. The specifications and dimensions of the connecting pipe configured by the unit are shown in Table 2-16. Since the manual may not be updated in time, the actual size shall prevail. When the length of the connecting pipe between the indoor and outdoor units is greater than 10m, you can consult the engineers and technicians of the air conditioning equipment company to recommend a suitable connecting pipe diameter.

When connecting pipes between the indoor unit and the outdoor unit, the pipes must be kept parallel to pass through the wall, and a wall sleeve must be added when the pipe passes through the wall. In order not to damage the pipe when perforated on the wall and to reduce vibration, it is necessary to wrap protective tape on the outside of the pipe and seal it with glue. The protective rubber plug of the pipe joint can only be removed when it is connected to the outdoor machine after passing through the wall.

All refrigerant circuit pipes should be welded at high temperature and filled with nitrogen for protection to prevent oxidation. Before use, perform pipeline cleaning, support, leak detection, vacuuming, and refrigerant pipeline resistance inspections in accordance with the industry's general operating specifications, and isolate the refrigerant pipeline from the building with an anti-vibration isolator.

Table 2-14 Air conditioning outlet copper pipe specifications

Model	Air side tube OD（mm）	Liquid side tube OD（mm）
XR023A	15.88	12.7
XR040A	19.0	15.88
XR050A	22.0	19.0

Remarks: The above is the size of the connecting pipe of the compressor built-in unit,the compressor built-in air pipe has different specifications from the compressor external air pipe.

Table 2-15Connecting pipes specifications of the XRow system(0m drop height)

Model	Length(m)	10	20	30	40	50	60
XR023A	Gas(mm)	16	16	16	19	19	19
	Liquid(mm)	13	13	13	13	13	13
XR040A	Gas(mm)	19	19	19	22	22	22
	Liquid(mm)	16	16	16	16	16	16
XR050A	Gas(mm)	22	22	22	22	25	25
	Liquid(mm)	19	19	19	19	19	19

The indoor unit is equipped with a ball valve on the connecting side. The connection of the ball valve is shown in Figure 2-22. When welding the ball valve should be wrapped with a damp cloth, and the ball valve core should be removed first.

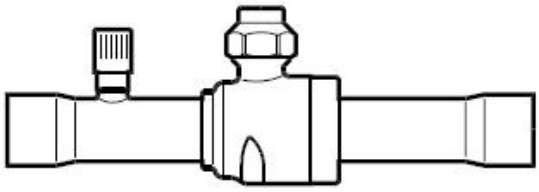


Fig. 2-22 Schematic Diagram for indoor unit connection pipe side ball valve

Note：

1、While connecting the pipes between the indoor unit and the outdoor unit, make sure the pipes go through the wall horizontally and are sleeved with protective tube when going through the wall. To protect the pipes against damage when the pipes going through the wall and to reduce vibration, the pipes shall be wound with protective tape and the hole shall be sealed with plaster. The protective plug of the pipe connector cannot be removed until it has penetrated the wall and begins to connect the external equipment.

2、The unit with pump cabinet or the unit with V-coil tube must be equipped with check valve. The one-way valve is installed near the air inlet of the outdoor unit condenser.

3、All the pipes shall be subject to high temperature soldering and be filled with nitrogen to prevent from oxidation. The pipe must be cleaned before welding process, such as using high pressure nitrogen to purge.

4、After welding, pressure leakage need to be inspected of the connecting pipe. HP nitrogen should be filled in the pipe to maintain pressure. It is recommended that the pressure should be 2.0~4.0MPa and the pressure leakage inspection time should be no less than 24 hours. After pipe leakage inspection inspection, vacuumize the pipe. The vacuum-pumping time should be no less than 1 hour.

5、The pressure leakage inspection and vacuum-pumping operation are passed, then proceed the next step(such as: the refrigeration line for support, and the refrigerant pipes shall be isolated from the building with the vibration-proof isolation frame.).
6、The above operations of each step, shall be based on industry general operation standard.

2.5.3 Refrigerant charge

When the unit leaves the factory, the indoor unit has been charged with a certain amount of refrigerant, and the outdoor unit has been charged with some nitrogen. The actual filling volume of the system is judged according to the degree of subcooling of the liquid pipe through debugging on site. The subcooling degree of the liquid pipe is equal to the difference between the saturation temperature of the refrigerant corresponding to the pressure before the electronic expansion valve (which can be indicated on the pressure gauge) and the temperature of the liquid pipe before the electronic expansion valve. The subcooling degree of the liquid pipe should generally be controlled within the range of 5~8K. If the charging amount is too large, the liquid pipe subcooling degree will be too large, on the contrary, if the charging amount is too small, the liquid pipe subcooling degree will be lower. The subcooling degree of the liquid pipe is the best way to judge the filling amount on site.

If the connecting pipeline between the indoor and outdoor units exceeds 5m, refrigerant needs to be added to the system to make the system operate normally.

The amount of refrigerant added is carried out in accordance with the above-mentioned method of detecting the degree of subcooling of the liquid pipe.

Note：

1. After the project is connected, the pre-charged refrigerant needs to be charged from the condenser side of the outdoor unit before starting up;
2. Additional refrigerant needs to be injected from the low pressure side after starting up.
3. Part of the external machine must be filled with nitrogen before welding. The internal nitrogen must be evacuated.

2.5.4 Add refrigerating oil

If the connecting pipeline between the indoor and outdoor units exceeds a certain length, it is necessary to add refrigerant to the system. The addition of refrigerant will cause the original refrigerating oil in the system to be diluted and affect the lubrication and cooling effect of the refrigerating oil. After charging the refrigerant, it is necessary to replenish the refrigerating oil. The additional formula is as follows:

The system needs to add additional amount of refrigerating oil (ml) = added amount of refrigerant × 15ml

The type of refrigerating oil varies from compressor to compressor, please consult the equipment company for details, and replenishing refrigerating oil requires a dedicated oil pump for pressure. At the site, the negative pressure in the unit can be used to replenish the refrigerating oil through the pressure gauge before the unit is charged with refrigerant and after a certain vacuum. Therefore, it is necessary to estimate the amount of refrigerant added.

The calculation of the amount of refrigerant added is based on the following formula:

Addition amount of refrigerant (kg) = Addition amount of refrigerant per unit length of liquid pipe (kg/m) × total length of extension liquid pipe (m)

Extend the total length of the liquid pipe (m) = the total length of the liquid pipe (m)-S (m)

Among them, S means that the air conditioner is filled with lubricating oil to meet the distance of the long connecting pipe. "The amount of refrigerant added per unit length of the liquid pipe" is shown in Table 2-16.

Table 2-16 Adding volume of the refrigerant in unit length of liquid pipe for liquid pipes of different outer diameters

Liquid pipe outer diameter (mm)	Adding volume of the refrigerant in unit length of liquid pipe (kg/m)
12.7	0.102
15.88	0.156
19.0	0.246
22.0	0.326

Note:At present, the units shipped out of the factory are pre-filled with some lubricating oil to meet the requirements of 50m long piping. If the on-site pipeline exceeds 50m, additional lubricating oil is required. It can be calculated according to the above-referenced formula.

2.5.5 Connection of the water supply pipe of the humidifier (optional)

The unit provides a quick connector for the water supply pipe (1/2" GAS female thread) of the humidifier. The users are suggested to install the cut-off valve and water supply filter for the water supply pipe to isolate the humidifier during the maintenance.

Note

1. The water supply shall adopt the ordinary tap water with the conductivity within the range of 300μS/cm~1250μS/cm.
2. The water supply pressure for the humidifier system shall be 0.1~0.8MPa.

2.5.6 Removal of compressor footer holder

The four footers of the compressor are equipped with the vibration isolating rubber gasket to reduce the vibration during the compressor operation. To prevent the compressor shaking during the transportation and the resulting pipe damage, three footers of the compressor are mounted with holders upon the delivery of the unit. The three holders are used for transportation only, and must be removed when installing the unit. The footer fixing bolts shall be tightened after the three holders are removed. The schematic diagram for the removal of the footer holders is as shown in Fig.2-23.

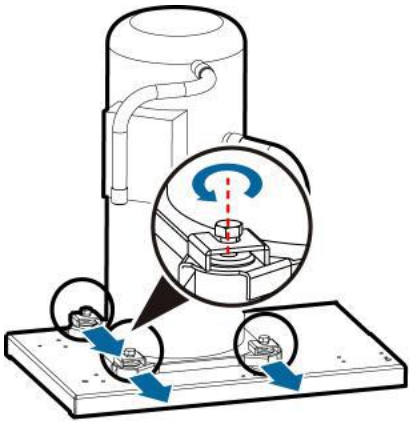


Fig. 2-23 Schematic diagram for the removal of the compressor footer holder

Note

If the compressor runs before the holders are removed, large vibration will be caused.

2.6 Electric connection

Note

1. The number of compressor fixed pieces depends on the size of the compressor.

2. The unit has high voltage. The power supply must be cut off before any troubleshooting is conducted inside the unit.

Each unit is configured with complete set of internal wire upon delivery. Please refer to the internal circuit diagram upon wiring. The wires to be connected onsite include:

1. Power cable of indoor unit: three-phase five-wire (3×L+N+PE);
2. Power cable of outdoor unit: three-phase five-wire (3×L+N+PE);
3. Pump cabinet power cable: single-phase (L+N+PE);
4. Outdoor unit control cable: 2 sets of 2-core wire;
5. Connection of communication cable between indoor unit and upstream device (optional);
6. Pump cabinet control wire: 2-core wire (twisted-pair shielded wire);
7. Indoor unit: Connection of the public alarm output line and control line of the remote switch (optional) ;
8. Low-temperature component power cable: single-phase (1L+N+PE); low-temperature component solenoid valve control line (2*0.75mm); power cord and control line are connected from the indoor unit.

Note

1、 Only the multi-core copper cable can be used as the power cable of the indoor/outdoor unit; make sure that all the connections are firm. Pay attention that the power supply voltage shall be the same as the rated voltage on the equipment nameplate.
2、 The communication line is not less than 2 × 0.5mm2 twisted-pair shielded wire. The shield of the shielded wire must be reliably grounded.
3、 DISCONNECT switch shall be installed in the distribution cabinet to disconnect the power supply to the equipment during the maintenance. The DISCONNECT switch of the distribution cabinet shall be selected according to the optional current value in Table 2-17
4、 To control the outdoor unit, it is suggested not to provide separate power supply to the outdoor unit. As the standard configuration, the outdoor unit is powered from the indoor unit.
5、 The connection of all the power cables, control cables and grounding wires shall comply with the national and local electrician regulations.
6、 The remote power switch is an active signal, and the factory default is short-circuited; if there are multiple units for remote power on / off, it cannot be connected in parallel and signal isolation is required.

Each model cables diameters （indoor, outdoor units and refrigerant pump） are shown as the Table 2-17 and Table 2-18.

Table 2-17 Diameter of power cord of each model unit

Model		Cable diameter of power cable of Indoor (mm^2)
Indoor unit		
XR023A	Cooling	5X6
	Cooling and heating	5X6
	Cooling, heating and humidifying	5X6
XR040A	Cooling	5X10
	Cooling and heating	5X10
	Cooling, heating and humidifying	5X10
XR050A	Cooling	5X16
	Cooling and heating	5X16
	Cooling, heating and humidifying	5X16
outdoor unit		
CS38/CS46/CS54/CS66/CS78/CS86		5X1.5
CS38U/CS46U/CS54U/CS66U/CS78U/CS86U		5X1.5
CS38P/CS46U/CS54P/CS66P/CS78P/CS86P		5X1.5
IF pump cabinet		
IFP1C		5X1.5
IFP3C		5X1.5
IFP5C		5X1.5

Table 2-18 Optional ammeters for power-off switches of power distribution cabinets of various types of units

Model		Optional current value （A）
Indoor unit		
XR023A	Cooling	32
	Cooling and heating	40
	Cooling, heating and humidifying	40
XR040A	Cooling	50
	Cooling and heating	63
	Cooling, heating and humidifying	63
XR050A	Cooling	63
	Cooling and heating	80
	Cooling, heating and humidifying	80
outdoor unit		
CS38/CS46/CS54/CS66/CS78/CS86		10
CS38U/CS46U/CS54U/CS66U/CS78U/CS86U		10
CS38P/CS46U/CS54P/CS66P/CS78P/CS86P		10
IF pump cabinet		
IFP1C		10
IFP3C		10
IFP5C		10

2.6.1 Indoor unit power cable connection

The unit adopts a three-phase five-wire system. The input power A/B/C is connected to the A/B/C of the main circuit breaker of the indoor unit, and the N and PE are respectively connected to the terminal block, as shown in Figure 2-24.

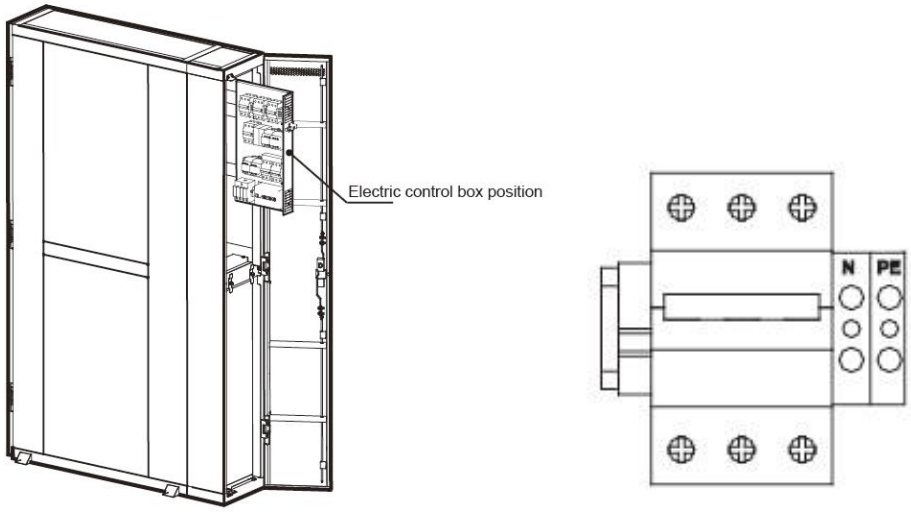


Fig. 2-24 Schematic diagram of the electrical connection of the indoor unit

Notes

1、The electric control box of XR023A is drawable. In order to facilitate the subsequent pulling and maintenance of the electric control box, an extra 0.45~0.5m should be reserved for connecting the power cord, which can be fixed on the top of the electric control box with a wire buckle.

2、If you do not follow the above instructions and cause the unit to short-circuit or the power cord to be torn, the customer will bear the loss, and the equipment company will not bear any responsibility.

2.6.2 Outdoor unit power cable connection

The three phases (A/B/C) of the power supply are led out from the DISCONNECT switch of the distribution cabinet and connected to the A/B/C terminals of the main circuit breaker of the indoor unit respectively. The N/PE wires are connected to the corresponding terminals. The wiring diagram is as shown in Fig.2-25.

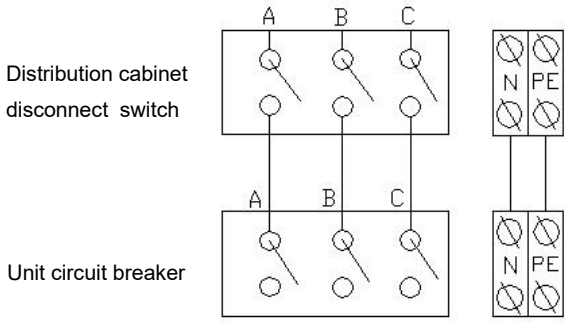


Fig. 2-25 Schematic diagram for the power connection of indoor unit

2.6.3 IF pump cabinet cable connection

The pump cabinet needs to be connected to the power line and the communication line:

The power cord is powered from the indoor unit or the outdoor electromechanical control box, using a three-phase power supply, and the input power is connected to the pump cabinet air switch.

The communication unit between the pump cabinet and the host computer can communicate with the host computer through the RS485 interface. It is recommended to use twisted-pair shielded cables for communication cables with a cable diameter of 2×0.5 mm^2. The wiring diagram is shown in Figure 2-26.

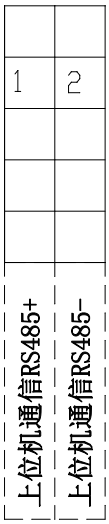


Fig. 2-26 Schematic diagram of the communication connection between the pump cabinet and the host computer

2.6.4 Connection of power cables of low-temperature components

The low-temperature components need to be connected to the power cord: (1L+N+PE), the solenoid valve control line of the low-temperature component (2*0.75mm); both the power cord and the control line are connected from the indoor unit. The electrical connections of low-temperature components are shown in Figure 2-27.

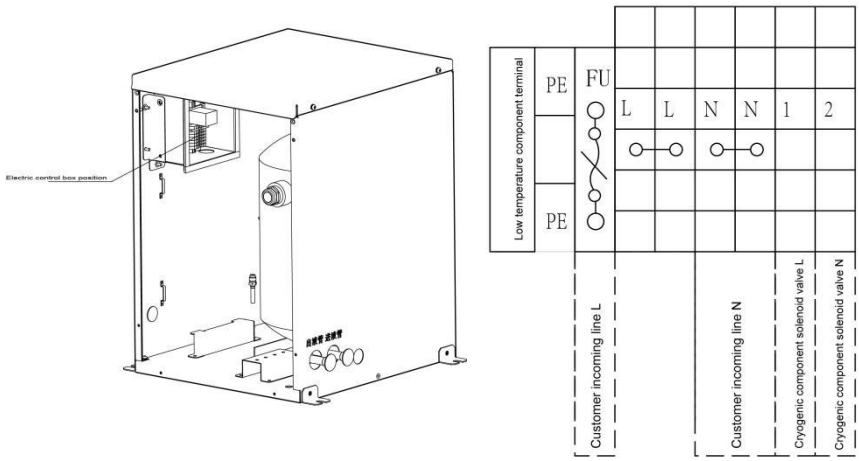


Fig. 2-26 Schematic diagram of electrical connection of cryogenic components

Notes

The schematic diagram of control line connection of XRow series is for reference only and the dedicated wiring diagram pasted on the unit shall prevail in terms of installation.

2.6.5 Unit function output

The location of the XR series unit control interface is shown in Figure 2-27. The partial enlarged view of the control interface is shown in Figure 2-28~Figure 2-30. The upper part of the terminal block is connected to the unit, and the lower part is the user control signal line interface.

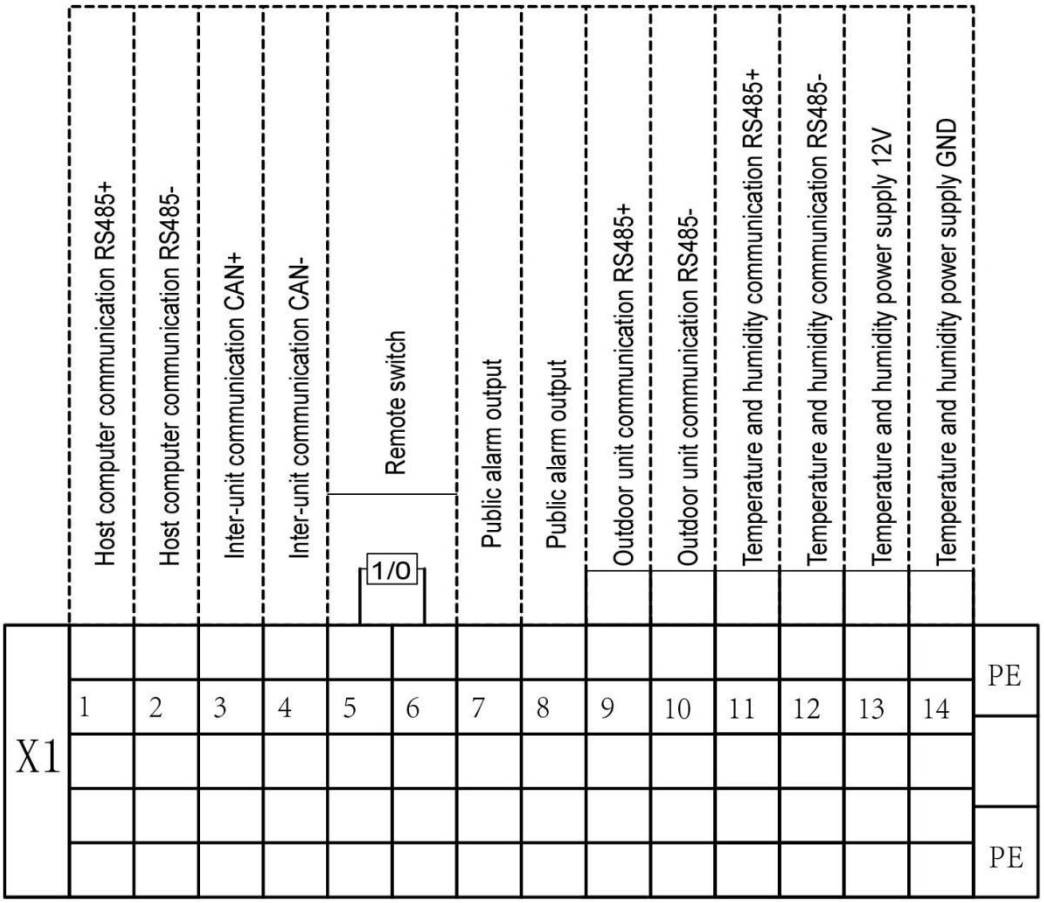


Fig. 2-27 XR control interface diagram

2.6.5.1 Communication between indoor unit and host computer

The unit can communicate with the host computer through the RS485 interface. It is recommended to use twisted-pair shielded cables for communication cables, and the cable diameter is not less than 2 × 0.5 mm2. The wiring diagram is shown in Figure 2-28.

Figure 2-28 Schematic diagram of the communication connection between the indoor unit and the host computer

2.6.5.2 Unit-to-unit communication

It is recommended that the communication cables between the units use twisted-pair shielded cables with a cable diameter not less than 2×0.5 mm2. The wiring diagram is shown in Figure 2-29.

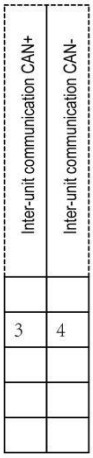


Figure 2-29 Schematic diagram of communication wiring between units

2.6.5.3 Remote switch

Through the remote switch interface, the user can control the operation of the air-conditioning unit. When the output is closed, the unit is turned on, and when it is

disconnected, the unit is stopped. When the unit leaves the factory, it is connected by short wiring at the 5/6 position of the terminal block as shown in Figure 2-30.

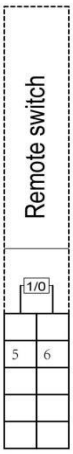


Figure 2-29 Remote switch machine (active) wiring diagram

The remote switch on/off is an active signal. If multiple units are linked for remote switch on/off, they cannot be connected in parallel in the project, and signal isolation is required.

2.6.5.4 Public alarm output

It is recommended that the public alarm output cable adopts shielded cable, and the cable diameter is not less than 2 × 0.5 mm2. The wiring diagram is shown in Figure 2-30.

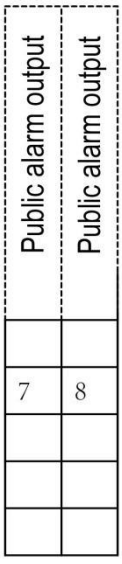


Figure 2-30 Schematic diagram of public alarm output wiring

2.6.5.5 Outdoor unit communication

The unit can communicate with the outdoor unit through the RS485 interface. It is recommended to use twisted-pair shielded cables for communication cables, and the cable diameter is not less than 2 × 0.5 mm2. The wiring diagram is shown in Figure 2-31.

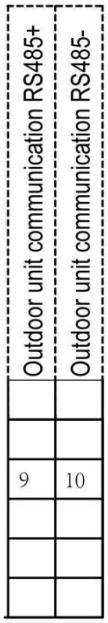


Figure 2-31 Outdoor unit communication

2.6.5.6 Temperature and Humidity Sensor

It is recommended that the temperature and humidity sensor cables use shielded cables, and the cable diameter should not be less than 4 × 0.5 mm2. The wiring diagram is shown in Figure 2-32.

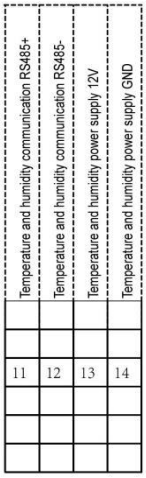


Figure 2-32 Wiring diagram of temperature and humidity sensor

2.6.5.7 Indoor unit communication

The outdoor unit can communicate with the indoor unit through the RS485 interface. It is recommended to use twisted-pair shielded cables for communication cables with a cable diameter of 2×0.5 mm2. The wiring diagram is shown in Figure 2-33.

Figure 2-23 Schematic diagram of indoor unit communication wiring

2.6.5.8 Communication and control of cryogenic components (optional)

The solenoid valve control line of the cryogenic component is connected from the indoor X3/X4 terminal; the wiring diagram is shown in 2-24.

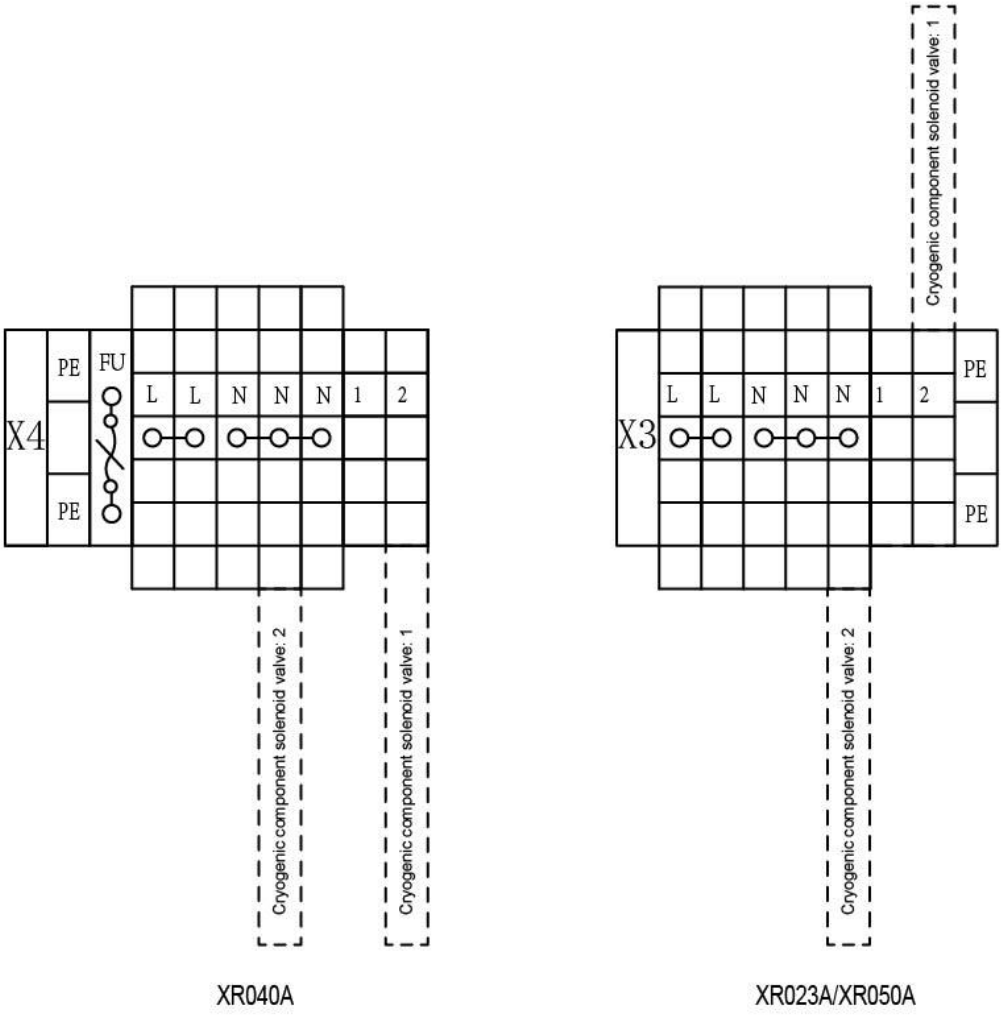


Figure 2-24 Schematic diagram of solenoid valve wiring for cryogenic components

2.6.5.9 Liquid pipe solenoid valve communication (optional)

The liquid pipe solenoid valve control line is connected from the X3/X4 terminal in the room, and the wiring diagram is shown in 2-25.

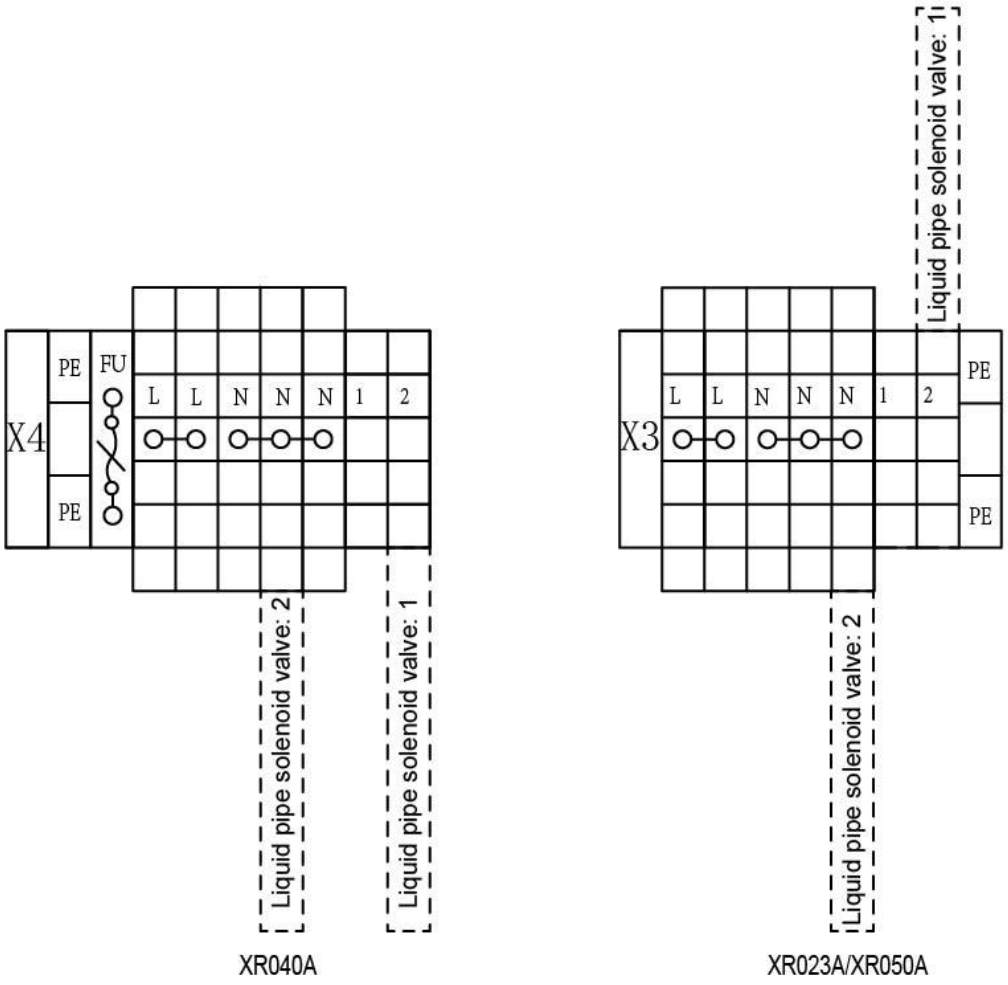


Figure 2-25 Schematic diagram of liquid pipe solenoid valve wiring

Notes

1. It is recommended to use shielded wire for the connecting wire, and the shielded wire must be grounded. The operating environment should be free of conductive dust, metal corrosive and insulating gas.
2. The engineering connection line should comply with the relevant engineering wiring specifications.

2.7 Items for verification when the installation is completed (checklist)

After the unit installation is completed, verify the following items. The unit can be powered on only when it completely passes the verification.

1. The device is placed horizontally and the installed fastening parts are locked.
2. The indoor and outdoor units and the fluorine pump are connected to the copper pipes, the refrigerant is well charged, and the refrigeration oil has been replenished (if necessary).

3. The ball valves on the indoor unit are all open.
4. The drain pipe is connected.
5. The water supply pipe to the humidifier is connected.
6. All pipe joints are fastened.
7. The pressing plate of the press has been removed.
8. The power supply voltage is the same as the rated voltage on the equipment nameplate.
9. The power cables & ground cables of the breakers , indoor unit, outdoor unit and refrigerant pump have been connected well.
10. When installing the equipment, the rating of the circuit breaker or fuse is correct.
11. The control cables of the optional devices of the breakers, indoor unit, outdoor unit, refrigerant pump have been connected well.
12. All cables and circuit connectors have been tightened.
13. After the installation of the device is completed, the sundries inside or around the device have been removed.
14. The fan runs smoothly without noise.

⃠ Note

Check if the pipe joints have any leakage at the beginning of the operation. There shall be no leakage.

Chapter 3 Controller

The XRow series indoor unit is equipped with a controller. The control layout is displayed by a touch screen, and parameter settings are made through the touch screen. The display screen is used to display the temperature, relative humidity, system operation, set values and alarms. Use these selection keys to adjust the cooling / heating or humidification and alarm control settings to operate the system, which is easy to use. This chapter introduces the menu operations and control features.

3.1 Unit display

The unit adopts 7-inch touch screen. The following information is provided through the interface: parameter setting, alarm record, system running status, etc. The menu adopts touch operation for menus.

3.2 System menu structure

3.2.1 System standby interface

3.2.2 System initialization interface.

After startup, the system will be initialized for 10s and then enter the normal display interface.

In case of system power cycle, the system will automatically enter the state before power down. (For instance, if the system is on before power down, It will automatically start up and enter the normal display interface.)

3.2.3 Password input interface

The default password is "0001", the user can change the temperature ,humidity and alarm set point, check the alarm recording, alarm history and system status.

3.2.4 Normal display interface

Press the Home button to enter the main menu, which includes the following contents:

System settings, temperature and humidity curve, operating records, historical alarm records and operating status.

The home page interface displays the current and set values of the current indoor return air temperature, current and set values of indoor humidity. Press the corresponding button on the home page to enter the corresponding interface.

After starting up, if keyboard-free operation is maintained for 180s under any interface, automatically return to the normal display interface.

After the system is powered on, press any key, the backlight is on, and if keyboard-free operation is maintained for 60s, the backlight will be off.

“ 

” is the air supply icon, which means that the unit is in the state of air supply;

“ 

” is the refrigeration icon, which means that the unit is in the state of refrigeration;

“ 

” is the heating icon, which means that the unit starts electric heating;

“ 

” is the humidifying icon, which means that the unit starts humidifying;

“ 

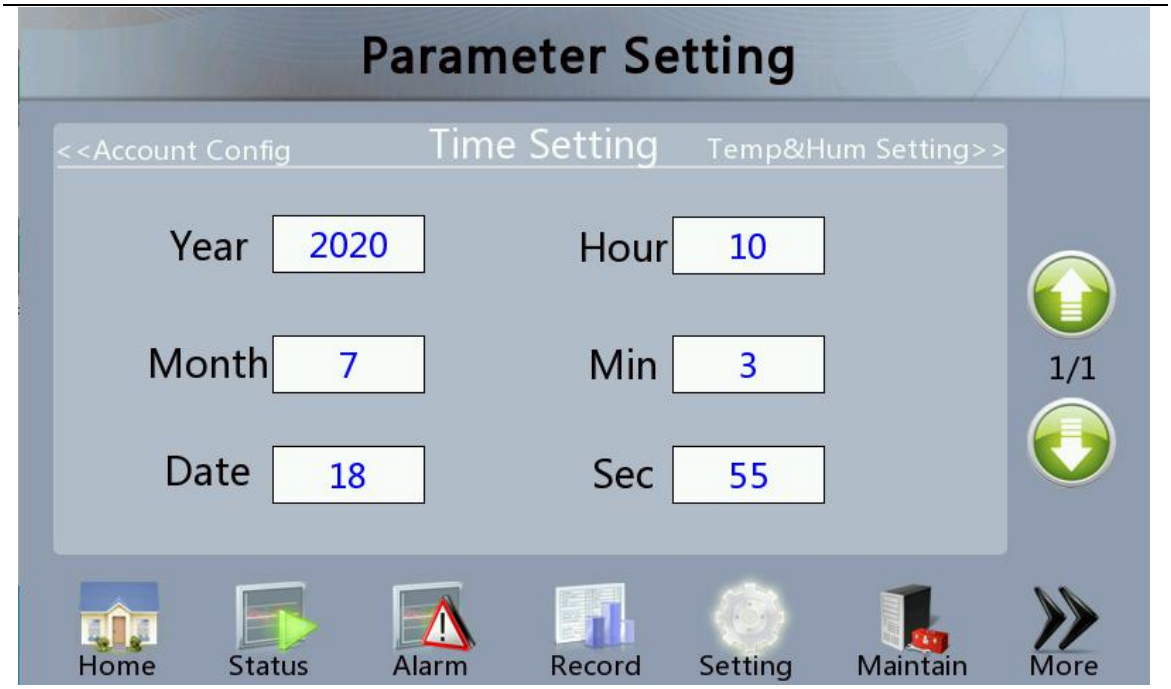
” is the dehumidifying icon, which means that the unit is in the dehumidifying state;

“ 

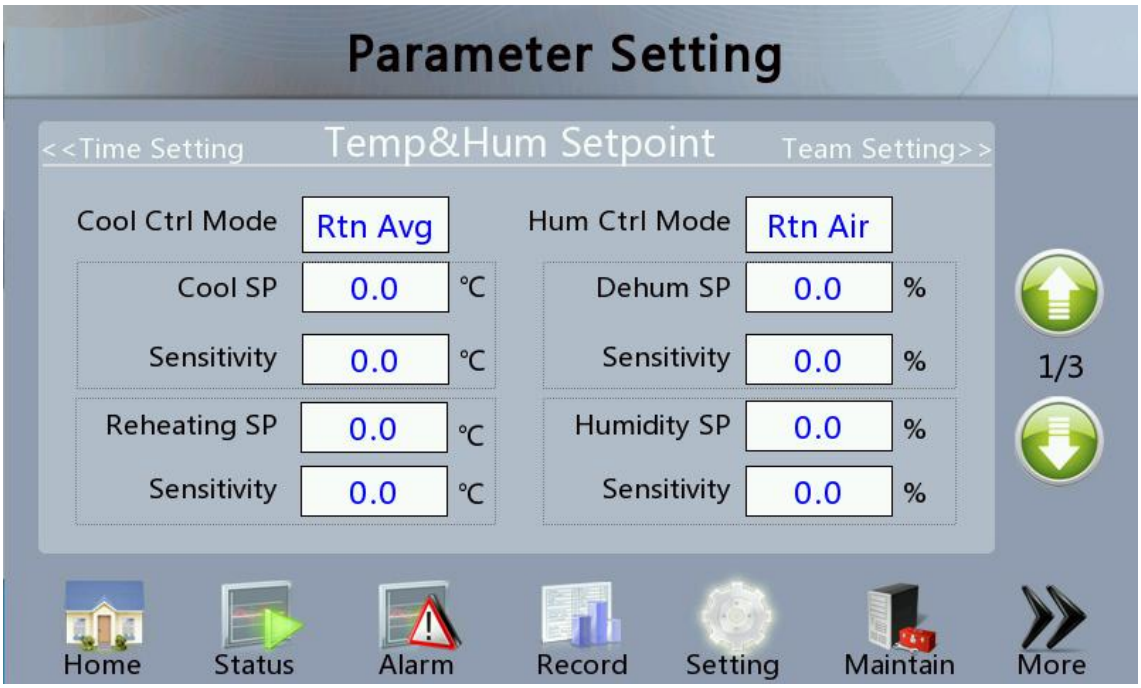
” is the alarm icon, which means that alarm occurs to the unit;

3.2.5 System Time Setting

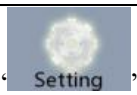
Time setting is in the main menu at the top right of this screen;



3.2.6 Parameter Setting



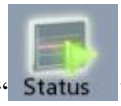
After entering the device parameter settings interface, the temperature and humidity of the environment can be set up according to user needs, and at the same time, the monitoring address, high and low temperature alarm, high and low humidity alarm set values and other contents can be changed.

Click “ 

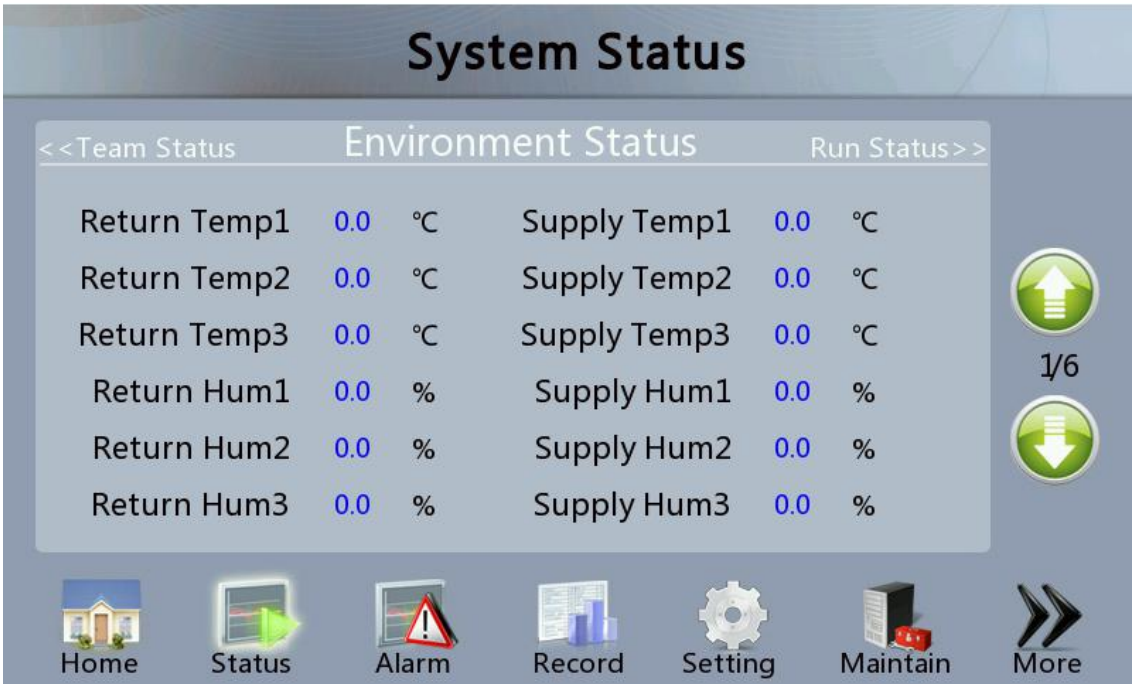
” on any interface to enter this interface.

3.2.7 System status

In this interface, you can check the operating status of the system and the status of the environment;

Click “ 

” on any interface to enter this interface.



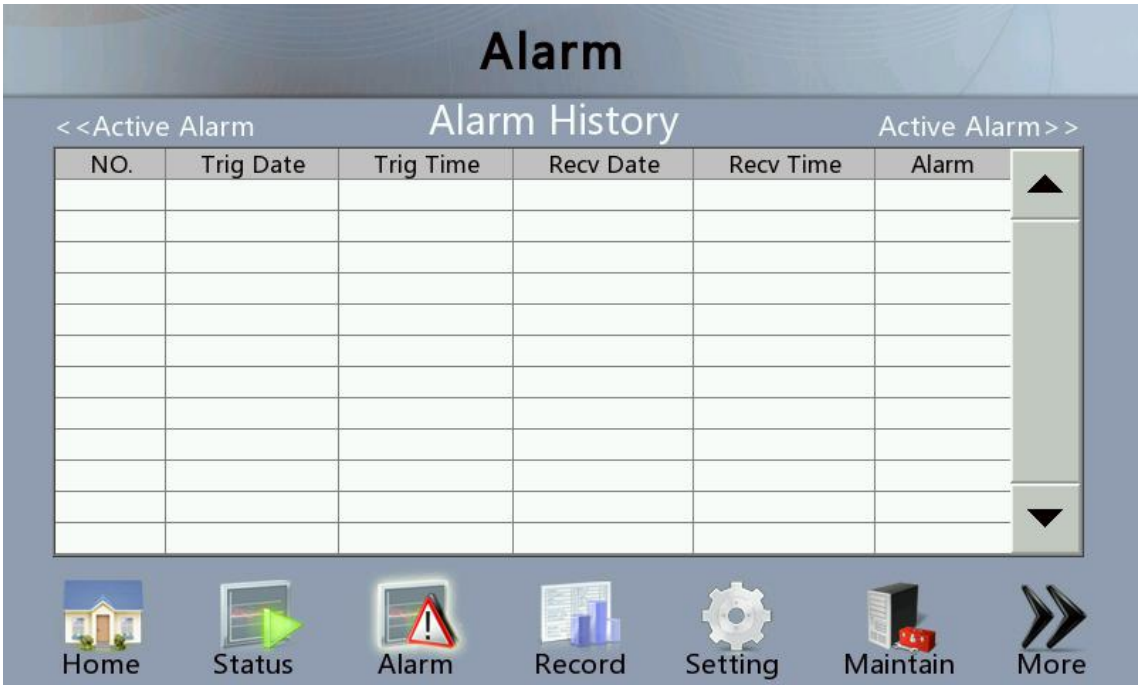
3.2.8 Active alarm

This menu shows the alarm of the active activity. The active alarm is numbered, and the latest alarm always appears first. The time when the alarm occurred is also recorded and displayed. You can check the number of alarms through this menu.

Click “ 

” on any interface to enter Alarm interface.Click “Active Alarm” on the top of the interface to enter this interface.

3.2.9 Historical alarm



Through the historical alarm, you can check the contents of the historical alarm and the time to cancel the alarm.

Click “ 

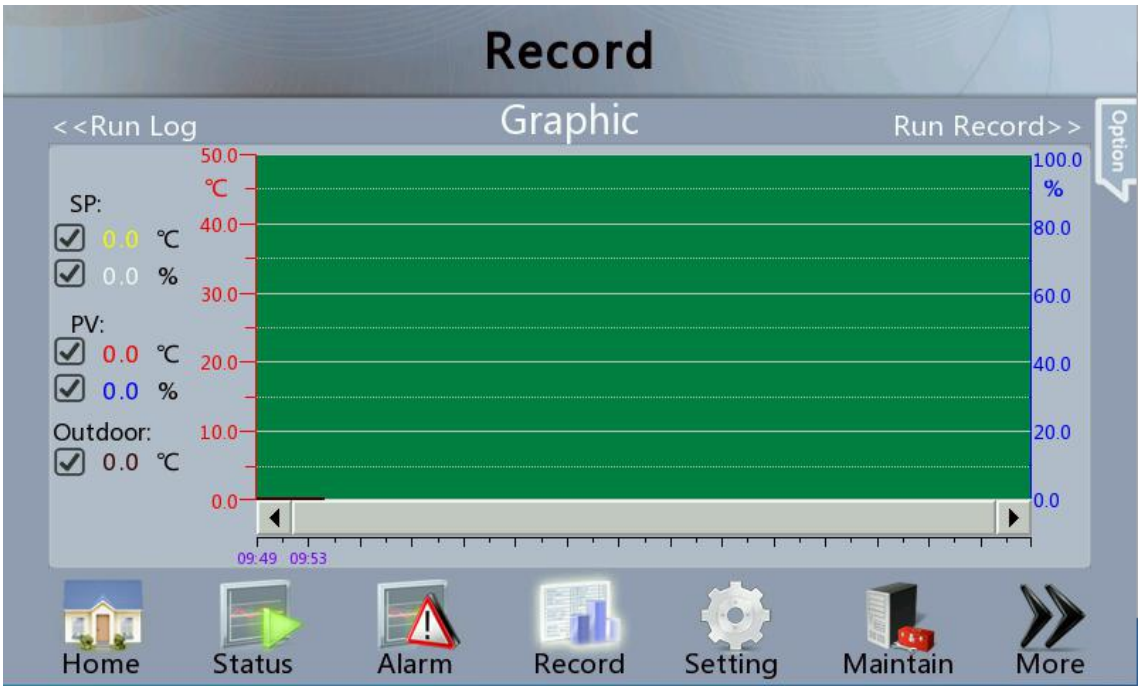
” on any interface to enter Alarm interface.Click “Alarm History” on the top of the interface to enter this interface.

3.2.10 Temperature and humidity curve

Display the curve of detection values of various sensors of the system and scale down and check the curve.

Click “ 

” on any interface to enter this interface.



3.2.11 Shutdown interface

Select the “ 

” button, “Sure to Power Off” appears, and if you need to shut down, click “OK”.

Chapter 4 System Operation

This chapter elaborates on how the XRow series air conditioners operate in accordance with the operation control of the operator and the indoor temperature and humidity status.

4.1 Temperature control

4.1.1 Cooling/Reheating

The microprocessor carries out the temperature control according to the cooling/reheating requirements calculated based on the difference between the return air temperature and the set value.

4.1.2 Cooling

When the temperature control calculates that the refrigeration demand reaches 20%, the compressor is turned on; the compressor is linearly regulated within the range of the refrigeration demand (20% ~ 100%); when the refrigeration demand is less than -20%, the compressor is turned off.

4.1.3 Reheating (optional)

When the temperature control calculates that the electric heating demand reaches 100%, the electric heating is turned on. When the heating demand is less than 50% of the heating start value, the electric heating is turned off.

4.2 Humidity control

4.2.1 Humidification requirements

Humidity control is based on the calculated humidification percentage requirement (that is, the difference between the relative humidity of the return air and the humidity setpoint). When the relative humidity of the return air is lower than the humidity set value, the humidification demand increases from 0 to 100% in proportion.

4.3 System protection

To protect the compressor and avoid frequent power-on/off cycle of the compressor, the compressor shall be restarted three minutes after its interrupted operation.

4.4 Communication

The control system uses RS232 / 485 interface to communicate with the equipment through the general electrical protocol. For a more detailed description, please refer to the "Monitoring Protocol".

Chapter 5 Alarm

The control system can display the alarm information. The special alarms can be selected through the optional alarm list. The alarm will automatically reset after removed.

5.1 Alarm: interpretation & troubleshooting

The following contents introduce the possible causes for each alarm and explain the methods of troubleshooting. For detailed explanation, please refer to Chapter 8 – Troubleshooting.

5.1.1 High-pressure alarm

High pressure of the compressor is monitored by the high-pressure switch. If the high pressure exceeds 4.0MPa , and the pressure switch acts, the controller will alarm and shut down the compressor. The alarm will be automatically eliminated when the high pressure is canceled.

When the high-pressure alarm appears, please detect whether power supply of the outdoor unit is off, the fan speed controller is normal, the fan of the outdoor unit works normally, the high-pressure switch is damaged, the coil of the outdoor unit is dirty and blocked, etc.

5.1.2 Low-pressure alarm

Low pressure of the compressor is monitored by the low-pressure sensor. If the low pressure is lower than 2.5MPa during the operation of the unit, the controller will send an alarm signal and turn off the compressor. The alarm will be automatically eliminated when the low pressure is canceled.

When the low-pressure alarm appears, please detect whether refrigerant leaks, fan of the indoor unit works normally, low-pressure switch is damaged, expansion valve is normal, etc.

Table 5-1 High and low pressure protection value of the refrigeration system of the compressor

Refrigerant model	Compressor high pressure protection value	Compressor low pressure protection value
R410A	4.0MPa	0.25MPa
R22	2.7MPa	0.15MPa
R134a	2.7MPa	0.15MPa
R407C	2.7MPa	0.15MPa

5.1.3 Fan failure

Indoor and outdoor fans use EC fans with built-in protection, and when the built-in protection device is triggered, the fan displays failure.

5.1.4 Humidity

The humidity alarm will be triggered in the following situations:

High humidity: indoor return air relative humidity is higher than the pre-set high humidity alarm setting value. Check whether the equipment is dehumidified.

Low humidity: indoor return air relative humidity is lower than the pre-set low humidity alarm setting value. Check whether humidification is set for the equipment.

Note :

Check whether the setting value is suitable. Check whether the room has the steam isolation zone to isolate the outdoor humidity, and whether the door and window are open.

5.1.5 Temperature

The temperature alarm will be triggered in the following situations:

High temperature: indoor return air temperature higher than the high temperature alarm set value. Check whether the set value is appropriate, whether the indoor load exceeds the design capacity of the equipment (e.g. the refrigerant output of the equipment is too small), and whether the cooling parts work normally (whether the compressor or valve has been started).

Low temperature: indoor return air temperature lower than the low temperature alarm set value. Confirm whether the set value is appropriate and whether all the heating parts work normally (i.e.,

contactors, heaters, etc). Check whether the working current of the heater is appropriate (refer to the current ratings on the nameplate of the equipment).

5.1.6 Power supply

The power supply alarm will be triggered under the following situations:

Overvoltage alarm: it alarms when the grid voltage of the equipment is higher than the input voltage range. The alarm will automatically restore when the voltage of the power grid returns to normal.

Undervoltage alarm: it alarms when the grid voltage of the equipment is lower than the input voltage range. The alarm will automatically restore when the voltage of the power grid returns to normal.

Phase loss/reverse phase fault: if the equipment uses three-phase input power, when the input power has reverse phase or phase loss fault, the equipment will stop operating. The alarm will automatically restore when the phase sequence is normal or the user manually changes the input phase sequence. If the optional automatic phase sequence switching component is configured, the unit will automatically adjust the phase sequence to ensure its normal operation.

5.1.7 Communication fault

1. It alarms if the communication cable between the display and the control input and output board fails.

2. When the indoor and outdoor unit communication cable connection is faulty, the alarm is triggered.

5.1.8 Sensor fault

The sensor fault will occur under the following situations:

Temperature sensor fails: when the temperature sensor has open circuit or short circuit, the alarm will be triggered. Check if the sensor has physical damages. The alarm will be removed automatically after the sensor is replaced.

Humidity sensor fails: On the screen , humidity display is "--",in this case control system to stop humidification, check if there is a circuit loose or the sensor has physical damages. The alarm will be removed automatically after the sensor is replaced.

Chapter 6 System testing and maintenance

This chapter details the control and operation of XRow series air conditioner.

Warning

The equipment is equipped with high voltage. Turn off the power supply before checking the inside part of the equipment. When the air switch of the unit is off, it's possible that the external connection power supply cable is still live.

6.1 Temperature Control

6.1.1 Cooling

To test the cooling function, make the temperature set lowest value 18° C . The system will make cooling request and start the refrigeration cycle (regardless of the temperature alarm). Adjust the temperature set value back to the desired value after finishing the test.

6.1.2 Reheating

To test the heating function, make the temperature set value 10ºC higher than the indoor temperature. The system will make heating request and start the heating cycle (regardless of the temperature alarm). Adjust the temperature set value back to the desired value after finishing the test.

6.1.3 Humidifying

To test the humidifying function, make the humidity set value 10% higher than the indoor humidity value RH. After a short delay, the humidifier will fill in water gradually and produce the steam. Adjust the humidity set value back to the desired value after finishing the test.

6.1.4 Floor flooding detection

Put the immersion electrode in the water, then the unit will display the floor flooding alarm and shut down. Dry the immersion electrode after the test. The alarm display will disappear when you manually reset the flooding alarm in the alarm menu. The fan will start up after time delay, and the alarm will not occur again.

6.1.5 Shut down via remote control

Users can switch on and off remotely through the touch screen switch key, remote power on / off dry contact, or through the communication port RS232 / 485.

6.2 Maintenance

6.2.1 Circuit board

The circuit board should be checked once a year, to see if the cable connection is loose and if the cable is aging.

6.2.2 Air filter

The air filter is always an easily overlooked component in the system. In order to ensure the effective operation of the equipment, the filter should be tested once a month and cleaned and replaced immediately when needed.

Warning

Before replacing the unit air filter, please ensure that the unit fan is stopped, otherwise it may cause injury accidents.

The air filter of the indoor unit is installed at the return air vent. Open the rear door panel, loosen the platen assembly and rotate it 90 degrees, and then the filter can be taken out directly. As shown in Figure 6-1.

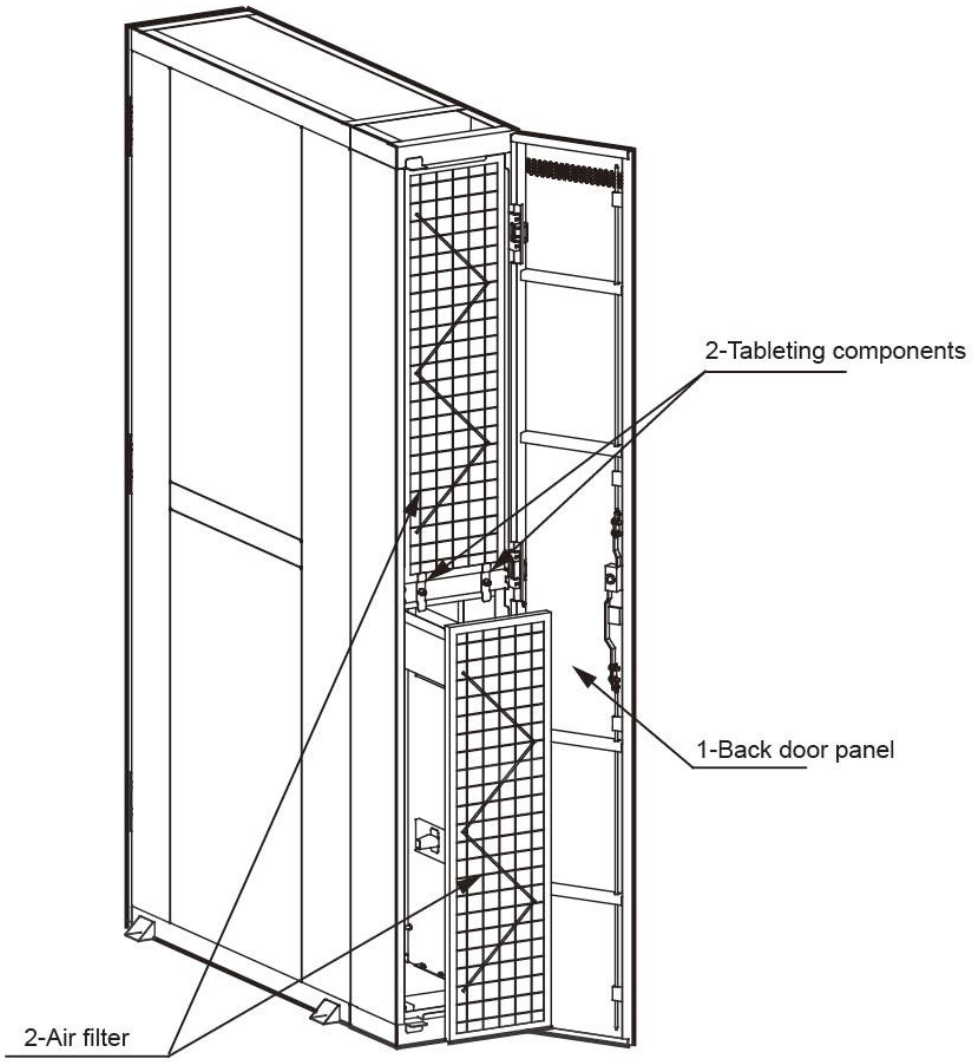


Figure 6-1 Schematic diagram of air filter maintenance

Notes

The schematic diagram of installation and maintenance of the air filter of XRow series indoor unit is for reference only, and as for installation, material objects shall prevail.

6.2.3 Fan

The fan components to be checked every month include the fan blades and motor. Replace the blade if it is broken. Check if the blade is firmly fixed on the motor bearings and if the blade grates the outside grille whiling turning. Though the motor bearings are permanently sealed and self-lubricating (which means there is no need to add the lubricant oil), you should check them once every month to see if they are worn down.

Airflow

The equipment of all models is designed to discharge abundance of air uninterruptedly, so any abnormal airflow block near the indoor and outdoor units should be removed at once.

6.2.4 Cooling system

The components of the cooling system should be checked every month to see if there are faults or worn down components. In most cases, the system breaks down first, and then the component wears down. Periodic inspection can prevent most components from wearing down. The cooling pipe must be firmly fixed without vibrating with the frames on the floor or of the equipment. Check if the cooling pipe is worn down and if it is firmly fixed every six months.

- **DX cooling system**

  Suction pressure

  Suction pressure is mainly determined by the indoor temperature and humidity and heat transfer of the evaporator. The range of pressure depends on the specific refrigerant model. For specific values, seen in Table 6-1.

  Discharge pressure

  Discharge pressure is mainly determined by the outdoor temperature and humidity and heat transfer of the condenser. The range of pressure depends on the specific refrigerant model. For specific values, seen in Table 6-1.

Table 6-1 Parameters of the pressure operating range of the refrigeration system

Refrigerant model	Suction pressure of the compressor	Discharge pressure of the compressor
R410A	700~1200kPa	2100~3400kPa
R22	400~700kPa	1300~2700kPa
R134a	200~400kPa	820~1850kPa
R407C	400~700kPa	1300~2700kPa

Expansion valve

The expansion valve can ensure supply appropriate amount of refrigerant to the evaporator, meeting the load requirement and ensuring certain return air superheat. By measuring the return air superheat, you can confirm if the expansion valve works normally. If there is less refrigerant in the evaporator, the superheat will be higher than normal value. Vice versa, if there is too much refrigerant in the evaporator, the superheat will be lower than normal value. The normal return air superheat is 5K to 10K.

Air-cooled condenser

If the air flow in the condenser coil is blocked, it will affect the heat exchange efficiency and cause high exhaust pressure and cooling loss to the compressor. Clean the coil with the compressed air, coil cleaner and water to clear away the dust and impurities that block the air flow. Do not let the snow pile up above or around the condenser in winter. Meanwhile, check if the coil fin is backwound or damaged, repair it if necessary. Check all the connecting pipes to see if they vibrate, and fix them if necessary. Check all the cooling pipes carefully to see if there is any oil leakage.

Replacement steps

- Compressor replacement

If the compressor motor is burnt down (it seldom happens if the system is correctly installed): Usually, the motor is burnt down after the mechanical or lubrication faults happen.

Early detection can avoid lots of problems, such as compressor damage. Periodic maintenance and inspection conducted by the maintenance person can effectively save the maintenance cost. To do necessary preventive maintenance, which is easy to operate with low cost, is much better than ignoring the problem until the compressor is damaged and replaced with high cost. When repairing the compressor, check all the electronic components to see if they operate normally.

ⓘ Warning

Avoid directly touching the gas and machine oil with your skin. Direct touch may cause injures. Wear long rubber gloves when disposing the polluted component.

1) Check all the fuses and circuit breakers.
2) Check the operating condition of the pressure switch.
3) When the compressor fails, confirm whether it is circuit fault or mechanical fault, and take corresponding measures.

If it is the compressor that fails, replace it. If the motor is burnt down, replace it and clean up the unit. Please note that if one system is burnt down successively, it is probably caused by incomplete clean. When a serious burnout happens, the machine oil will be black and acid. In this case, clean the whole cooling system (including the indoor evaporator, outdoor condenser, refrigerant connecting pipes and expansion valve) before replacing the compressor, and then replace the drying filter.

You can get another compressor from the product supplier of Envicool and the supplier will transfer the compressor packaged in a reusable wooden box to the site (in accordance with the after-sales service). If the compressor to be replaced is under warranty, it shall be sent back to Envicool to get warranty service. The compressor should be placed in its original packaging box used when it is purchased. Fill in the possible cause or conditions that cause the damage on the maintenance sheet enclosed with the compressor.

The correct steps to remove and replace the compressor are as follows:

a) Cut off the power supply;
b) Install the low pressure and high pressure gauges to the corresponding connectors.

c) Recycle the refrigerant with standard steps and equipments.

Note

Refrigerant recovery or recycling must comply with the state and local laws and regulations.

1. Remove the damaged compressor.
2. Sweep the entire system with clean nitrogen, clean the entire refrigeration system with a cleaning agent if pipes contain a lot of black impurities. As for the relevant operating specifications, please refer to the relevant local and industry specifications and ask professional and qualified maintenance personnel.
3. Install and replace the compressor, replace the dry filter and connect all components. Carry out the nitrogen pressure maintaining (time of pressure maintaining is not less than 24h) and leak-proof test, R410A pressure maintaining shall be not less than 3000kPa.
4. Evacuate the system, the first two is 150Pa and the third is 60 - 80Pa. In terms of the first two times, nitrogen shall be added every time after evacuation, and then evacuate again to bring water of the system out.
5. Charge the refrigerant. Please refer to super-cooling requirements in Section 2.5.4.
6. Turn on the power supply to run the device. Check if it is running normally.

6.2.5 Humidifier

The humidifier system includes a humidifying container with electrodes embedded, water supply pipe, water drainage valve, steam transferring pipe, steam distributing pipe and humidifying control panel, etc.

The humidifier's automatic water drainage /manual water drainage switch is located near the humidifying container. When the humidifier works normally, the switch should be at the automatic water drainage position, and when it requires manual water drainage, the switch should be at the manual water drainage position.

When the humidifier operates, the hydraulic pressure of the water supply system should be 0.1 to 0.8MPa.

Warning

Since the surface temperature of the humidifying container may be too high, when replacing it, let it cool down first or wear protective gloves before touching.

- Steps to replace the humidifying container:
  1. Drain off the water in the humidifier container manually.
  2. Shut off the power supply of the unit.

3. Pull out the steam transferring pipe on the humidifying container.
4. Rive the power connecting cables of the main electrode.
5. Pull out the connecting cable of the detector of high water level.
6. Loosen the fixing belt on the humidifying container, and lift up the container to remove it.
7. Fix the new humidifying container, and connect the steam transferring pipe.
8. Connect the cable between the main electrode and the detector of high water level.
9. Set the humidify switch at the automatic water drainage status, and check it again to finish the replacement.

Note

The drain pipe of the unit shall not be higher than the water drainage outlet of the humidifier.

Chapter 7 Maintenance inspection checklist

XRow series

Date：_____Defender：_____

model：_____NO：_____

Maintenance Project Quarterly

Component	Maintenance work
Air filter	Clean filter.
Cooling System	Check and clean up equipment drain.
	Check and clean up the condensed water.
	Check high and low pressure of system.
	Check whether there is abnormal vibration system.
	Check if there is a dirty wall heat exchange coil.
Refrigerant Pump	Check whether there is abnormal vibration and sound.
Fan	No debris between the blades.
	No abnormal sound .
	No abnormal vibration.
Humidifier	Check mineral deposition.
	Check electrode.
	Check whether connection hose is connected reliably.
	Check whether valve is blocking or drain.
Controller	Whether circuit connectors are loose.
	Whether connecting cable is aging.
Heater	Whether there is corrosion.
	Whether cable is loose.

Remark：

Sign：_____

Copy this table in order to make records

Chapter 8 Troubleshooting

Failures	Causes	Check or maintenance
The equipment does not start up.	The equipment is not connected to power supply.	Check the voltage of air switch of the unit.
	Remote startup and shutdown positions are incorrect.	Check whether the cable of remote startup and shutdown ports of electric control box gets loose.
	Control panel does not display “refrigeration” command.	Regulate the temperature control set value to the refrigerating temperature.
The equipment does not refrigerate or refrigerating effect is poor.	Startup interval is too short.	Control program controls the delay time of compressor’s shutdown and startup to be 3 minutes.
	Compressor contactor has poor contact.	Check the contactor.
	The discharge pressure of compressor is too high.	Refer to 5.1.1 instructions for high pressure alarm.
	Dry filter is blocked.	Replace dry filter.
	Refrigerant is filled little.	Check condensate depression of pressure and liquid pipe. Under low temperature, sufficient refrigerant is very important to low-temperature startup subassemblies.
	The air volume for condenser coil is insufficient.	Clear the coil or impurities entering into air inlet.
Compressor condensation Too high pressure	Insufficient air flow in condenser coil.	Increase the humidification control set value and sensing value to make the system require humidification.
	The outdoor unit fan does not turn.	Check fan motor voltage, fan speed controller output and fan operation.
Humidifier not humidified	The "Humidification" command is not displayed on the control panel.	Increase the humidification control set value and sensing value to make the system require humidification.
	Defective cable board or humidifier cable board.	Check the cable connection or replace the interface board. Check the cable connection between the control board and the humidifier circuit board.

	Humidity sensor has failed.	Humidity is shown as a dash. Check the cable connections from the temperature / humidity circuit board to the control panel and the remote control to the control panel. Check temperature / humidity circuit board.
	No water flow.	Make sure the humidifier is in the “Run” position. Check the water supply to the humidifier, including the filter screen.
	The water injection rate of the humidification tank cannot keep up with the steam discharge rate.	Inspect the screen and capillaries of the water valve for blockages. Check the water supply pressure. (10 ~ 40kPa).
Display is not responding or control keys are not responding	The circuit is open or shorted.	Check the circuit for open or short circuit and repair it.
Continuous cooling	Short circuit or control board failure.	Check the cable connection or replace the control board.
Ineffective heating	The "Heating" command is not displayed on the control panel.	Increase the temperature setting to meet the heating requirements.
	Heating protection is open circuit, heating contactor failure or interface board failure.	Check heating contactor and heating protection; if not, check circuit.
	The component is burned out.	Turn off the power. Check the heating element with an ohmmeter.
	Temperature sensor has failed.	Replace with a new temperature sensor.

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